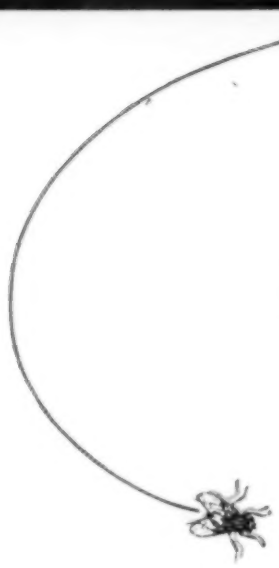
AGRICULTURAL *Chemicals*

Quality* INSECTICIDES



Only POWCO BRAND can give you these positive assurances of consistent top laboratory-controlled *quality* in every insecticide shipment.

* **FINENESS**—ALL POWCO BRAND insecticide powders are reduced to micron-size particles by high powered precision equipment. This insures the dusting qualities you need for maximum insect control.
* **EMULSIFICATION**—All POWCO BRAND insecticide emulsion concentrates are designed to produce the most desired emulsions in your particular type of water.
* **WETTABILITY-SUSPENSIBILITY**—All POWCO BRAND wettable powders are highly suspensible and wet quickly for ease in application and maximum effectiveness.

POWCO BRAND insecticides cost you no more but pay you well. For details, call your nearest Powell representative, or write direct to our New York office.

John Powell & Company

Division of Olin Mathieson Chemical Corporation
One Park Ave., New York 16, N. Y.
Philadelphia, Pittsburgh, Chicago, Denver,
Fort Worth, Omaha, Atlanta

DDT · TOXAPHENE · BHC · CHLORDANE · LINDANE · ROTENONE · SABADILLA
PYRETHRUM & PYRIN · ANTU · PIPERONYL BUTOXIDE · MALATHION · ALLETHRIN
TEPP · PARATHION · ALDRIN · DILAN · HEPTACHLOR · 2, 4-D & 2, 4, 5-T · FLY FLAKES

LOOK TO POWELL...FOR CONSISTENT, TROUBLE-FREE QUALITY

New Giant Servant of Agriculture

One thousand feet below the earth's surface in our mine near Carlsbad, New Mexico, our personnel are putting the finishing touches on what is said to be "the longest underground conveying installation in the country."

This new seven and one-half mile long system will for the most part do away with old type locomotive haulage and provide greater efficiency and better service facilities for our customers.

Another Giant Servant of Agriculture of the Potash Company of America.

P.C.A.

The SALT of the EARTH

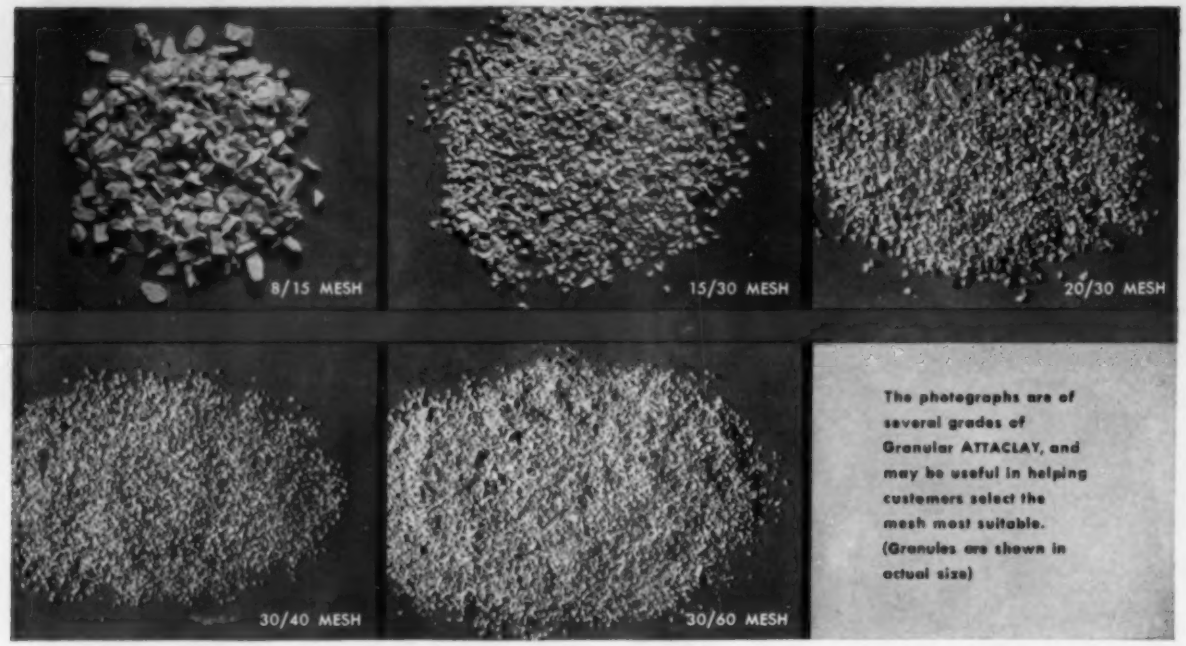
RED MURIATE

POTASH COMPANY OF AMERICA

CARLSBAD, NEW MEXICO.

General Sales Office . . . 1625 Eye Street, N.W., Washington, D.C.
Midwestern Sales Office . . . First National Bank Bldg., Peoria, Ill.
Southern Sales Office . . . Candler Building, Atlanta, Ga.

• *These five pictures may be the pattern of better business for you*


8/15 MESH
15/30 MESH
20/30 MESH
30/40 MESH
30/60 MESH
The photographs are of several grades of Granular ATTACLAY, and may be useful in helping customers select the mesh most suitable. (Granules are shown in actual size)

for **GRANULAR PESTICIDES** (*soil and other use**)

. . . GRANULAR ATTACLAY

If you're a processor with granular pesticides in mind, you can get going faster and keep growing steadier with Granular ATTACLAY and M & C technical help.

You Can Make A Superior Product. Granular ATTACLAY is made from the same highly sorptive material as Attaclay. It works well with toxicants . . . suffers minimum breakdown in processing . . . provides the versatile and efficient means of formulating pesticides, fungicides or herbicides.

Your Market Is Substantial. The demand for granular formulations is growing by leaps and bounds. It includes small-package business for home lawns and gardens, as well as the big tonnages earmarked for mosquitos, pasture pests, corn root-worm, etc.

*Interesting New Above-The-Ground Use—Corn borer control in Iowa. Granular pesticides (from plane or ground rig) hit the host foliage, filter down and accumulate in the whorl and axial of leaves, kill the pest at point of greatest danger. (In the Gulf area, corn bud worm is controlled by the same technique.)

New 8-Page Bulletin, Technical Help, Samples. Our years of experience with granular grades may provide just the answer to your formulation, production or application problem. We urge you to check the coupon and mail it today.

ATTAPULGUS PRODUCTS *from*

MINERALS & CHEMICALS CORPORATION OF AMERICA

210 W. WASHINGTON SQUARE, PHILADELPHIA 5, PA.

ALWAYS A BETTER WAY . . .

MINERALS & CHEMICALS CORPORATION OF AMERICA
Dept. P, 210 W. Washington Square, Philadelphia 5, Pa.

☐ Please send new 8-page bulletin with full technical data on Granular Attaclay.

☐ I'm interested in free test samples of the following mesh sizes _____.

name _____ position _____

company _____

address _____

city _____ zone _____ state _____

AGRICULTURAL *Chemicals*

Protein hydrolysate-malathion bait spray being applied as a mist concentrate to a commercial mango orchard at rate of 20 gals. per acre. See story p. 32.

Vol. 10. No. 11 November, 1955

AGRICULTURAL *Chemicals*

ARTICLES

EDITORIAL 31

BAIT SPRAYS FOR FRUIT FLY CONTROL 32
By Loren F. Steiner

DISCUSSION AT THE FERTILIZER ROUND TABLE 35

SOME EFFECTS OF THE MILLER LAW ON THE U. S. PESTICIDE INDUSTRY 37
By Dr. Walter T. Reed

CANADIAN AGRICULTURAL CHEMICALS ASSOCIATION CONFERENCE 39

WHAT GOVERNMENT RESEARCH MEANS TO THE PESTICIDE INDUSTRY 42
By Samuel W. Simmons

NITRIC PHOSPHATE PRODUCTION 45
By Tah Ho Huang

CAROLINAS-VIRGINIA PESTICIDE FORMULATORS ELECT CROWN 47

THE PART THE PESTICIDE FORMULATOR PLAYS IN MAKING A PESTICIDAL COMPOSITION 49
By J. Cochran

CONTROL OFFICIALS MEET IN WASHINGTON 52

SUMMARY OF TOLERANCE APPLICATIONS FILED UP TO OCT. 1, 1955 FOR PESTICIDES 58

FEATURES

INDUSTRY MEETING CALENDAR 24

FERTILIZER VIEWS AND NEWS 51
By Vincent Sauchelli

THE LISTENING POST 55
By Kelvin Dorward and Paul Miller

TECHNICAL SECTION 63

WASHINGTON REPORT 69
By Donald Lerch

INDUSTRY NEWS 71

SUPPLIERS' BULLETINS 94

CLASSIFIED ADVERTISING 117

ADVERTISERS' INDEX 121

TALE ENDS 122

Publisher
Wayne E. Dorland
Managing Editor
Eleonore Kanar
Technical Editor
Edward Meier
Advertising Manager
Ralph Dorland
Editorial Advisory Board
Dr. Alvin J. Cox
Lea S. Hitchner
Dr. S. E. A. McCallan
Dr. Charles Palm
Dr. Colin W. Whittaker

MEMBER AUDIT BUREAU OF CIRCULATIONS

PUBLISHED monthly on the 1st by Industry Publications, Inc.

ADVERTISING and Editorials office, P. O. Box 31, Caldwell, New Jersey.

PUBLICATION Office: 123 Market Pl., Baltimore, Md.

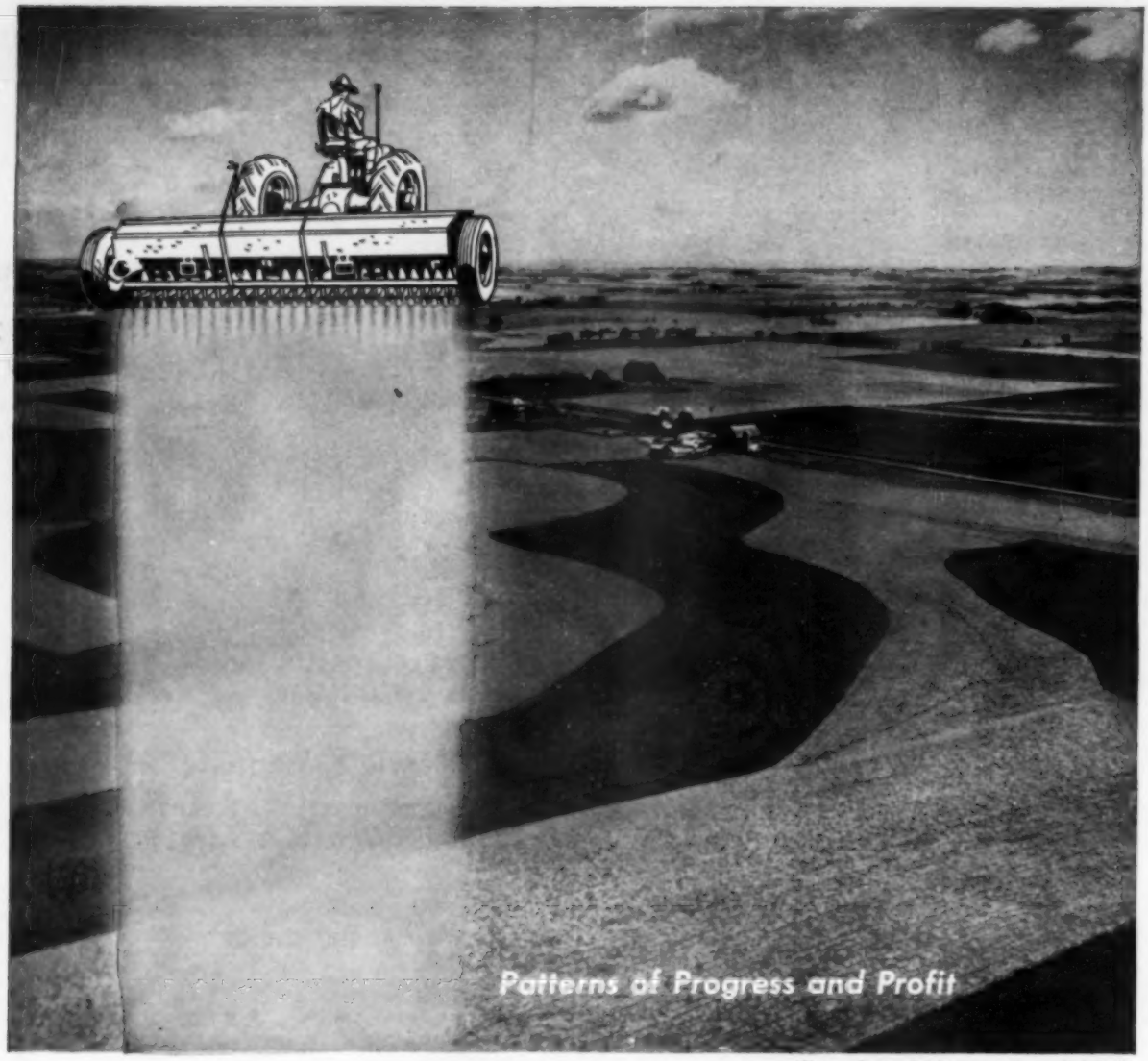
CHICAGO Office: 333 N. Michigan Blvd., Chicago, Ill.

ENTERED as second-class matter November 4, 1949 at the Post Office at Baltimore, Md., under the Act of March 3, 1879.

SUBSCRIPTION RATES: United States, 1 year, $3.00; 2 years, $5.00. Canada and Pan American countries, 1 year, $4.00; 2 years, $7.00. All other foreign countries, 1 year, $9.00; 2 years, $15.

SINGLE COPIES: current issue: $0.50; all back numbers $1.00. Postage and handling charges for foreign countries on single copies: $1.00. Claims for missing numbers will not be allowed if received more than 60 days from date of mailing. No claims allowed from subscribers arising from failure to notify the Circulation department of a change of address, or because a copy is "missing from files."

ADVERTISING RATES known on request. Closing date for copy—5th of month preceding month of issue.



(Photo — Courtesy Soil Conservation Service, U. S. D. A.)

High Grade Muriate of Potash

by DUVAL

Duval Muriate of Potash ranks high as one of the essential nutrients which greatly increase yield and profits in crop production.

DUVAL SULPHUR and POTASH CO.
Modern Plant and Refinery at Carlsbad, New Mexico

Address all communications to:
ASHCRAFT-WILKINSON CO.
Exclusive Distributors
ATLANTA, GEORGIA
Cable Address: Ashcraft

NORFOLK, VA. • CHARLESTON, S. C. • TAMPA, FLA. • JACKSON, MISS. • COLUMBUS, OHIO • DES MOINES, IOWA

Give your product

"Sacks Appeal!"

GOOD LOOKS never fail to attract.

Even when it comes to shipping sacks.

So . . . if *your* shipping sacks lack warmth and brilliance of appeal, let us give them our S. A. treatment which never fails to create real interest on the part of both prospect and present buyer.

By all means send for evidence as to how our exclusive Kolorseal process assures a fine, highly-colorful reproduction of impressive copy and design!

Better yet, call in the Raymond man! No obligation in the least.

THE RAYMOND BAG COMPANY
Middletown, Ohio. Phone 2-5461

Raymond

MULTIWALL PAPER SHIPPING SACKS

more and more

granulated

fertilizer manufacturers

are turning to

LOUISVILLE / rotary dryers rotary coolers

to speed production . . .

reduce drying costs

Installations are individually engineered for your problems. Results can be pre-determined in our pilot plant. We'll be glad to show you how the fertilizer industry has found a new way to efficient and profitable drying.

A Louisville engineer will survey your present operation without obligation on your part. Take advantage of Louisville's equipment and experience. Phone or write today.

LOUISVILLE DRYING MACHINERY UNIT

GENERAL AMERICAN TRANSPORTATION CORPORATION

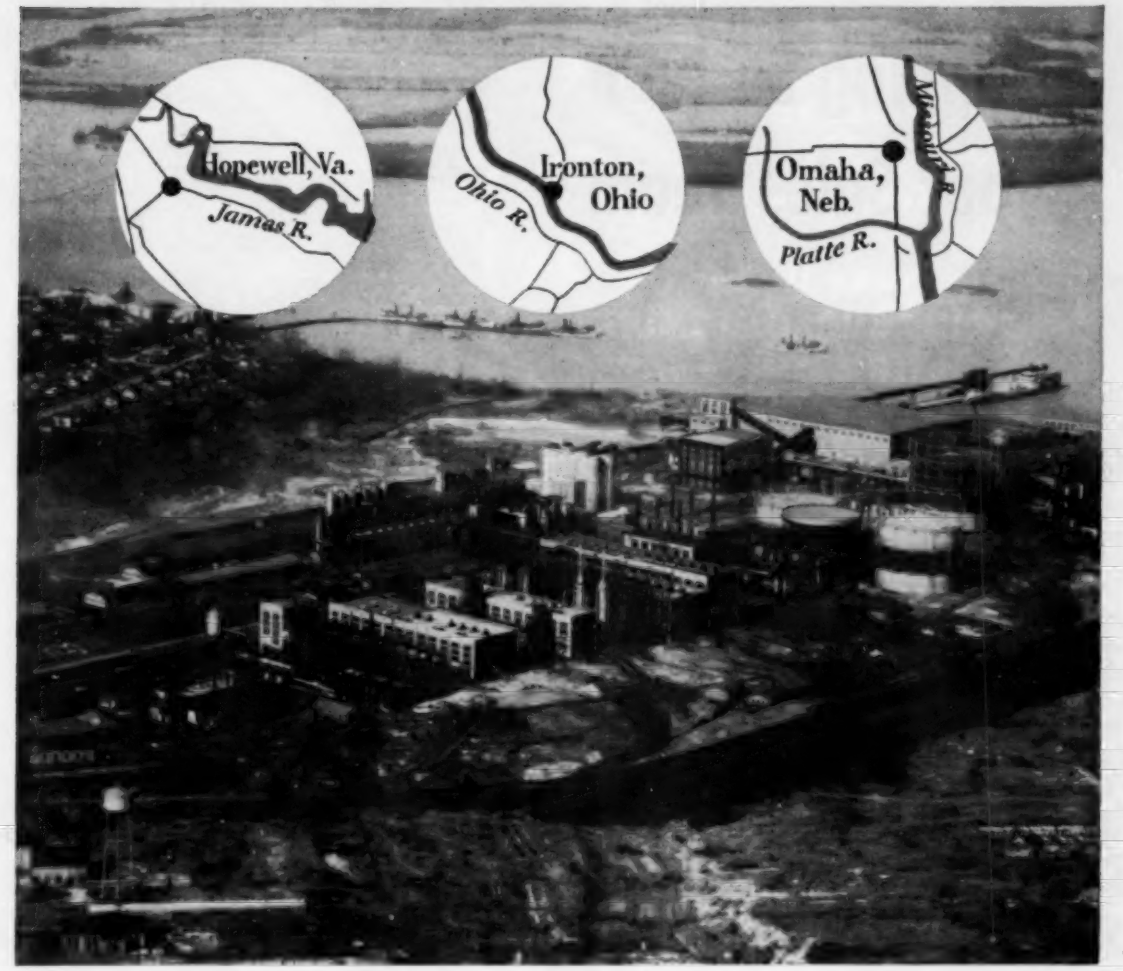
Dryer Sales Offices: 139 So. Fourth Street, Louisville 2, Kentucky • 380 Madison Ave., New York 17, New York

General Offices: 135 So. LaSalle Street, Chicago 90, Illinois

In Canada: Canadian Locomotive Company, Ltd., Kingston, Ontario

OFFICES IN ALL PRINCIPAL CITIES

South, North or West...



There's a Nitrogen Division plant ready to serve you . . . handy for shipping by rail or by highway. Three big and growing plants at Hopewell, Virginia, at Ironton, Ohio, and at Omaha, Nebraska, are strategically located to serve the fertilizer industry. We have the quality, the volume and the shipping capacity to supply your needs for Nitrogen Solutions and solids.

Call on us also for technical help based on 25 years of Nitrogen Solutions research and development. Improved new NITRANA®, URANA® and U-A-S* Nitrogen Solutions can help you turn out better-conditioned, top-quality mixed goods, often at lower cost. Ask for the help of one of our technical service representatives available to our customers without charge.

Arcadian

PRODUCTS FOR PROFITABLE FARMING

Nitrogen Solutions (Nitrana® and Urana®)
American Nitrate of Soda
A-N-L®
Nitrogen Fertilizer
Urea Fertilizer
Sulphate of Ammonia

*Trade-mark

NITROGEN DIVISION Allied Chemical & Dye Corporation
New York 6, N. Y. • Hopewell, Va. • Ironton, Ohio • Omaha 7, Neb.
Indianapolis 20, Ind. • Kalamazoo, Mich. • Columbia, Mo. • Atlanta 3, Ga.
Columbia 1, S. C. • San Francisco 3, Calif. • Los Angeles 5, Calif.

NITROGEN DIVISION ALLIED CHEMICAL

Put your Shipping Sack on your Sales Team

....with attractively designed brands and brilliant multi color printing by HAMMOND

Hammond Betterbags

Hammond Multi-Walls

"TREES . ARE A CROP"

Outstanding in appearance and durability . . . Hammond Multi-Wall bags create enthusiasm and pride among your sales representatives . . . help to increase sales through distributors and dealers . . . build prestige for your company and products, and provide complete protection of contents from packing machines to the ultimate consumer. Yes, you can put your shipping sack on your sales team by specifying Hammond Multi-Walls.

For Multi-Wall Bags,
"Make it a Habit to Depend on Hammond"

HAMMOND BAG & PAPER COMPANY

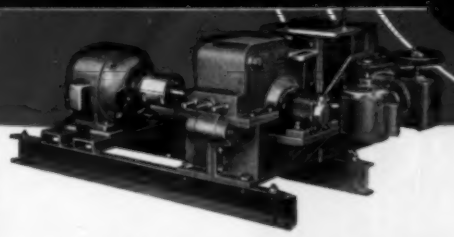
General Offices: Wellsburg, W.Va.
Plants in Wellsburg, W.Va., Pine Bluff, Ark., Charlotte, N. C. and Palatka, Fla.

Representatives in the following cities NEW YORK, N.Y., CHICAGO, ILL., MINNEAPOLIS, MINN., KANSAS CITY, MO., CLEVELAND, OHIO, ATLANTA, GA., BALTIMORE, MD., DALLAS, TEXAS, CHARLOTTE, N. C., LIGONIER, PA., BLUEFIELD, VA., PALATKA, FLA.

HAMMER MILLS

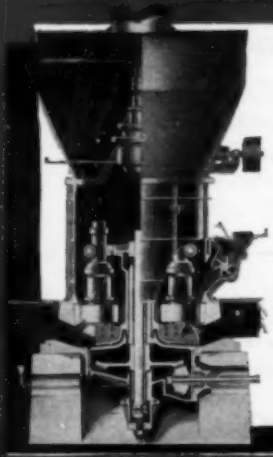
A size for every purpose! Williams Hammer Mills are designed to do the **complete job in a single operation.** No primary or secondary crushers required—extra foundations, conveyors, other expensive equipment are eliminated—thus saving as much as 75% on initial investment and up to 50% on grinding costs!

WILLIAMS has the *Right Answers* to all your GRINDING, CRUSHING, SEPARATING PROBLEMS



HELIX-SEAL HAMMER MILLS

Combines the advantages of a hammer mill with screw-type feed to obtain finenesses from 100 to 325 mesh. For dustless, cleaner, safer dry grinding—accurate, non-clogging reduction of sticky and wet materials. Eliminates separators, fans and cyclones. Furnished with water or steam jackets.



ROLLER MILLS WITH AIR SEPARATION

Pulverizes and blends with exceptional accuracy down to 400 mesh or micron size. Dries as it grinds. Instant size adjustment—automatic self-adjusting feed—many other exclusive features that mean improved quality and output.

Whether your job demands crushing power shovel-loaded stone to 8 mesh or smaller in a single operation—whether it is pulverizing or blending, with or without air separation, of limestone or insecticides to finenesses down to 400 mesh, or even micron sizes—whether it is closed-circuit dustless dry grinding, or the grinding of wet and sticky materials to 325 mesh—there is a Williams "proved-in service" machine that can give you **A BETTER PRODUCT—FASTER PRODUCTION—and LOWER COSTS.**

It will pay you to get the facts about Williams equipment, and learn what it can do for your specific operation. **Write Today For Literature.**

Send Us Your Questions

Complete testing and research facilities are maintained by Williams to develope the **right answers,** especially for your operation, on every size reduction problem. Write for information and the help of an experienced Williams technician.

OTHER WILLIAMS EQUIPMENT

- Drier and Impact Mills
- Air Separators
- Vibrating Screens
- Complete "Packaged" Plants

WILLIAMS PATENT CRUSHER & PULVERIZER CO.

2707 N. Broadway ★ ★ ★ St. Louis 6, Mo.

WILLIAMS

CRUSHERS GRINDERS SHREDDERS

OLDEST AND LARGEST BUILDER OF HAMMER MILLS IN THE WORLD

It pays you, the dealer and the farmer to concentrate on the premium

CASH IN ON THE SWING WITH THESE QUALITY

SULFATE OF POTASH

High grade, low chloride *International Sulfate of Potash* can help you build a profitable volume of business on the premium fertilizers made for crops adversely affected by excess chlorides. Your farm customers will get improved quality and increased yields on high value crops such as tobacco, potatoes, vegetables, tree fruit and small fruit when they use fertilizers made with sulfate of potash. This quality plant food material is soluble, well conditioned and can be used without changing your present mixing processes.

At Carlsbad, New Mexico, *International* mines and refines these fine quality plant food materials for fertilizer manufacturers:

Sul-Po-Mag—Double Sulfate of Potash-Magnesia—22% K_2O—18% MgO
Sulfate of Potash—50% K_2O Minimum Muriate of Potash—60% K_2O Minimum
Muriate of Potash—Granular—60% K_2O Minimum

International Minerals & Chemical Corp.

potash division

fertilizer grades needed for profitable production of many crops.

TO PREMIUM FERTILIZERS POTASH MATERIALS

Sul-Po-Mag

Water-Soluble Double Sulfate of Potash-Magnesia
$K_2SO_4 \cdot 2MgSO_4$ | 22% K_2O · 18% MgO

Sul-Po-Mag enables you to produce premium grade fertilizers with a properly balanced combination of *two* essential plant foods: *sulfate of magnesium* and *sulfate of potash*. Both are water-soluble and readily available to growing crops.

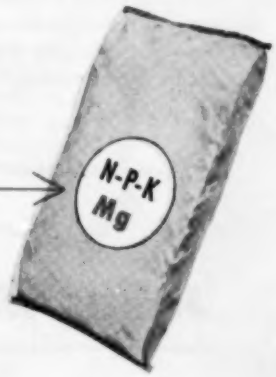
Agricultural experiment station studies show that the soils in many crop-growing areas are critically low or deficient in available magnesium. In fact, this nutrient is so important to profitable crop production, it's often called *the fourth element in the fertilizer bag.*

Sul-Po-Mag has been advertised consistently in farm papers for many years. You'll find a welcome market for premium grades containing *Sul-Po-Mag* for use on soils that are deficient in magnesium and potash. For many farmers know from experience it helps them increase crop production, increase quality and increase profits.

When you use *Sul-Po-Mag* in the bag, identify it on the bag . . . N-P-K-Mg tells farmers that yours is a premium fertilizer.

PUT IT IN THE BAG

PUT IT ON THE BAG



INTERNATIONAL MINERALS & CHEMICAL CORPORATION
General Offices: 20 North Wacker Drive, Chicago 6

. . . use CELITE

One way to be sure of producing a dry dust concentrate that will give top performance in the field is to use Celite in your primary grinds.

The presence of only a small percentage of this diatomite powder—because of its great bulk per unit weight, and the irregular shape of the individual particles—fluffs up the final dust. This helps neutralize the effect of heavy extenders—insuring better dispersion of the poison.

Celite is also an excellent absorption medium for liquid poisons. Its exceptionally high absorption capacity permits a much higher percentage of liquid poison to be absorbed while still maintaining a dry dust concentrate. This results in a more potent effect in the final product . . . as well as in lower packaging and shipping costs.

Why not investigate the use of Celite as a means of improving your product and making your operation more profitable? For further details, write Johns-Manville, Box 60, N. Y. 16, N. Y.

Properties of CELITE

FINENESS: Approximately 100% through 325 mesh
DENSITY (Vibrated): 11 pounds per cubic foot
BULK: Celite bulks much higher than most diluents
ABSORPTION: 200% of its weight of water
300% of its weight of kerosene
pH VALUE: Below 7.0
INERTNESS: Compatible with insecticide and fungicide poisons
SUSPENSION: Excellent in both air and water
COMPOSITION: Celite is amorphous diatomaceous silica (SiO_2)

Celite is Johns-Manville's registered trade mark for its diatomaceous silica products.

Johns-Manville CELITE

JOHNS-MANVILLE JM PRODUCTS

DILUENTS AND GRINDING AIDS

Two CHEMICO - designed plants

produce over 900 tons per day of anhydrous ammonia for Lion Oil Company

Production volume at the El Dorado Chemical Plant reached an all time high in 1954. Total of all nitrogen products manufactured for sale increased 10 per cent over the previous year.

Anhydrous ammonia, which is the basic product of the plant and the raw material for the manufacture of other nitrogenous materials, was produced at an average rate of 582 tons per day throughout the year. The comparative figure for 1953 was 576 tons daily with the same equipment.

The Barton Plant near New Orleans, Louisiana, was completed in June, 1954, after a construction period of about 18 months. The manufacturing facilities were gradually brought up to full production and operated at rates above the designed daily capacities of 300 tons of anhydrous ammonia, 430 tons of nitric acid and 550 tons of pelleted ammonium nitrate. This plant was formally dedicated on October 25, 1954, in ceremonies attended by employees, their families and many guests.

Extracts from the 1954 Annual Report of Lion Oil Company, referring to Plants designed by Chemico to produce 900 tons per day of anhydrous ammonia and corresponding amounts of nitric acid and ammonium nitrate.

CHEMICAL CONSTRUCTION CORPORATION

A UNIT OF AMERICAN CYANAMID COMPANY

Designers and constructors of complete plants and facilities for the chemical, metallurgical and petrochemical processing industries for over 40 years

525 WEST 43RD STREET, NEW YORK 36, NEW YORK

Cable Address: Chemiconst, New York • Technical Representatives: Cyanamid Products Ltd, London South African Cyanamid (Pty) Ltd., Johannesburg

CC 899

CHEMICO

CHEMICO CHEMICAL CONSTRUCTION CORPORATION

FMC CHEMICALS

THE PLAIN TRUTH ABOUT PIPERONYL BUTOXIDE

It's one of the most amazing insecticidal synergists to come to light in the laboratory in recent years.

In combination with pyrethrum, *piperonyl butoxide* forms the *versatile* Pyrenone* concentrates — steps up the killing power of pyrethum at least 10 times. *Butoxide* itself has definite insecticidal properties. Yet it is virtually *non-toxic* to man or warm-blooded animals. It is equally as safe as pyrethrum, if not more so.

STABILIZES PYRETHRUM

Piperonyl butoxide also stabilizes pyrethrum in these two important ways:

1. **Reduces deterioration of pyrethrum by screening out ultra-violet light.**
2. **Acts as an acid acceptor and thus retards decomposition and polymerization of pyrethrum.**

Net result of this two-way stabilizing action is to increase the shelf-life of the end product — and to make it more effective in practical applications against insects for *longer* periods of time.

READILY SOLUBLE

Readily soluble in all common organic solvents, *piperonyl butoxide* is also a solvent in its own right. It minimizes, and often makes unnecessary, the use of other solvents and aromatics which may impart undesirable odors to end products. And because this superior synergist is an ether, *butoxide* is stable to the action of other chemical agents and exposure conditions—such as, heat, light and atmospheric changes.

For complete technical data . . . typical formulations for specific end uses . . . and sample label statements, write the nearest Fairfield Chemical Division office, Food Machinery and Chemical Corporation. Sales Headquarters: 420 Lexington Avenue, New York 17, N. Y. Branches in Principal Cities.

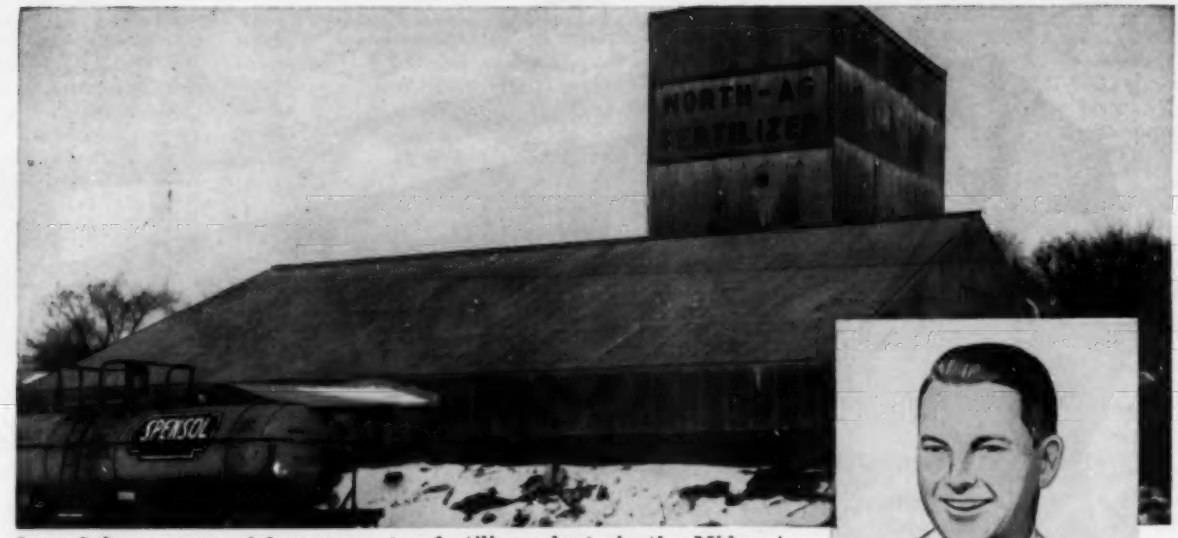
*Reg. U. S. Pat. Off., F.M.C.

Pyrenone

FAIRFIELD CHEMICALS
TRADE MARK

fmc Chemical Divisions

OHIO-APEX *Plasticizers and Chemicals* WESTVACO CHLOR-ALKALI *Alkalis, Chlorinated Chemicals, Carbon Bisulfide* FAIRFIELD CHEMICAL *Insecticides and Organic Chemicals*
NIAGARA CHEMICAL *Insecticides, Fungicides and Industrial Sulphur* BECCO CHEMICAL *Peroxygen Chemicals* WESTVACO MINERAL PRODUCTS *Phosphates, Barium and Magnesium Chemicals*



One of the newest and fastest growing fertilizer plants in the Midwest is the North-Ag Chemical and Supply Co. of Forest City, Iowa. The company was established in October, 1954, and is now completing an expansion to double its storage capacity.

Lewis Eymann (above) is partner and general manager of North-Ag Chemical and Supply.

North-Ag Chemical & Supply

. . . Another Spensol User

Here is some of the modern equipment used by Spencer to produce SPENSOL Nitrogen Solutions for some of America's leading fertilizer mixers.

On time deliveries of SPENSOL solutions have helped to build Spencer's reputation for dependable service to mixers throughout the country.

New kind of solution injector, giving better ammoniation of mixed fertilizer, was invented by H. B. Davis of Spencer Chemical Company staff.

SPENCER

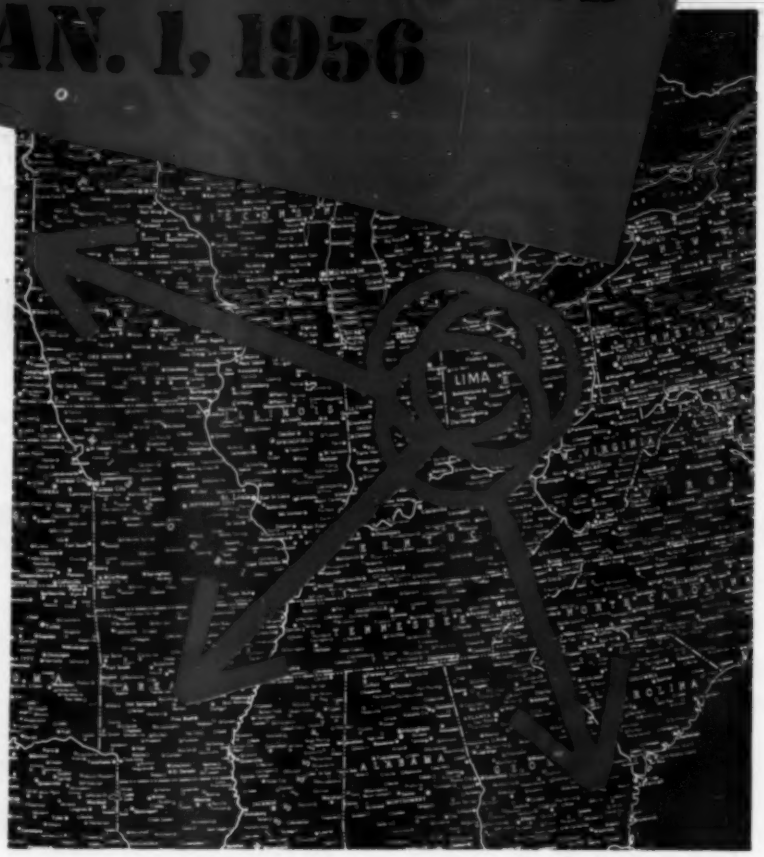
SPENCER CHEMICAL COMPANY, Dwight Bldg., Kansas City 5, Mo. District Sales Offices: Atlanta, Ga.; Chicago, Ill.; Memphis, Tenn.; Works: Pittsburg, Kans.; Henderson, Ky.; Chicago, Ill.; Vicksburg, Miss.; Orange, Texas.

America's Growing Name in Chemicals

Your new source for nitrogen chemicals

SOHIO CHEMICAL COMPANY

BEGINS SHIPMENTS JAN. 1, 1956



Coming Soon!!!

A complete line of nitrogen chemicals—tailor-made to suit the most complex requirements of the fertilizer industry.

Anhydrous Ammonia **Urea**
Aqueous Ammonia **Urea Solutions**
Nitrogen Solutions **Nitric Acid**

Planned with you in mind

Ready to serve your needs faster and more economically—is our fleet of new tank cars, tank trucks, and van drays.

Assured source of supply

Production of our complete line of nitrogen chemicals gets underway this fall at our new Lima, Ohio plant. But . . . in order to serve you better during your peak season, we will accumulate most of our production in our huge storage facilities until the first of the year. Then . . . on January 1, 1956 we will begin shipments against contracts.

SOHIO

For Complete Product listing

and price quotations . . . write to

SOHIO CHEMICAL COMPANY

P. O. Box 628 • Lima, Ohio

LOW COST LIVING INDEX

CLEAN DRY AIR

FRESNO ST. COLLEGE

2 TRANSCONTINENTAL RAILROADS

YOUNG LABOR POOL

BEAUTIFUL CHURCHES

GROWING COMMUNITY

ACID FREE AIR

...Investigate FRESNO'S Industrial Park Sites

In the Distribution Center of California's Great Central Valley

FRESNO *Industrial* PARK OF CALIFORNIA

Our business is "servicing you." Inquiries held in strict confidence.

FRESNO CHAMBER OF COMMERCE, DEPARTMENT OF INDUSTRY, P. O. BOX 1469

IDEAL CLIMATE

SUPER SPEED 4 LANE HWY.

YOSEMITE 2 HR. DRIVE

7th CALIF. CITY IN SIZE

MIDWAY BETWEEN L A-SAN FRANCISCO

MODERN SCHOOLS

LOW COST POWER & WATER

16 MAJOR TRUCK LINES

of one to eighteen within a radius Fresno is the heart of the wonder

and a new $20,000,000 college. Fresno is the heart of the wonder

Francisco. Five cents per square foot will buy more business opportunities,

you an abundance of cheap power, health, recreation, educational insti-

Here's another ANTARA aid for PESTICIDE FORMULATORS

We have just published a bulletin containing typical starting formulations for the preparation of emulsifiable concentrate and wettable powder forms of herbicides and insecticides.

Developed through the combined efforts and experience of ANTARA technical service and research groups, the formulas in this booklet will guide formulators in developing suitable liquid and powder forms of pesticides.

As always, we have trained men available to consult with manufacturers and compounders on specific problems of formulating insecticides and herbicides using ANTARA emulsifiers, spreaders, wetting agents and dispersants.

Write today for the new booklet, "Antara Surfactants in Insecticides and Herbicides."

From Research to Reality

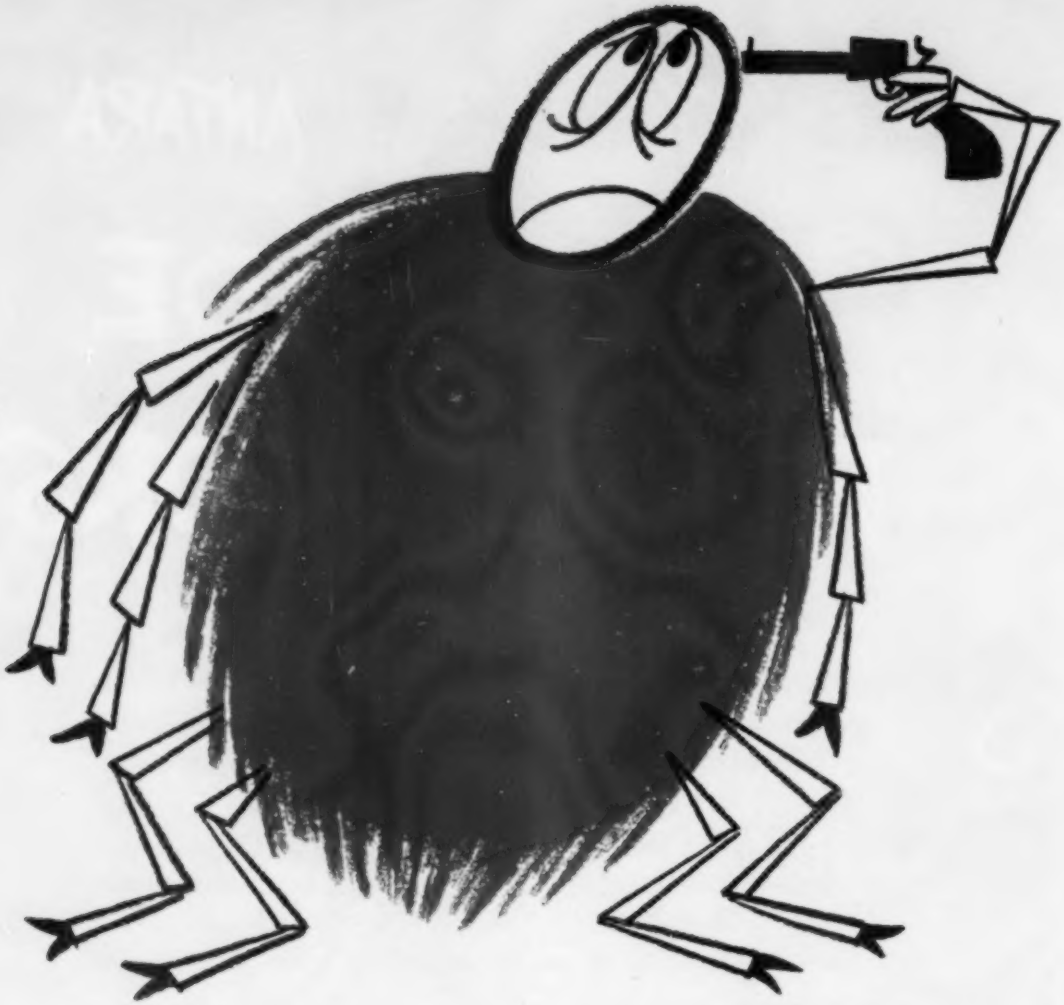
ANTARA CHEMICALS

A SALES DIVISION OF GENERAL ANILINE & FILM CORPORATION

435 HUDSON STREET · NEW YORK 14, NEW YORK

SALES OFFICES: New York · Boston · Providence · Philadelphia · Charlotte · Chattanooga · Chicago Portland, Ore. · San Francisco · Los Angeles · IN CANADA: Chemical Developments of Canada, Ltd., Montreal

ANTARA gaf



For you . . . there's a future with Attaclay

Carriers for
granular pesticides

We are leaders in developing granular grades for soil pesticides, herbicides and fungicides. Write for samples and for your copy of our latest report on this promising field.

This unhappy spider mite obviously doesn't benefit through pesticide dusts formulated with Attaclay. So let's forget him, and take a look at the people with a *future* in Attaclay.

Formulators in ever-growing numbers have adopted Attaclay as their *across-the-board* carrier, diluent, and conditioner. These men have product lines that may range from six to sixty formulations, covering dust bases, wettable powders, and finished dusts. The savings brought by Attaclay in simplified inventory alone mean vastly lowered costs. Scheduling and procurement problems are next to non-existent, and carrier-handling costs are cut to the bone.

Men in the trade prefer Attaclay as a carrier because of time-proven experience with its versatility and high sorptivity. Attaclay shortens cycle times and cuts "clean-out" downtime in *any* kind of reduction mill or impregnating blender. It takes all of the popular toxicants in stride. It gives new meaning both to processing ease and product quality.

Can you see across-the-board savings in your future with Attaclay? Let us give you the whole story.

ATTAPULGUS

ATTAPULGUS PRODUCTS *from*
MINERALS & CHEMICALS CORPORATION OF AMERICA
DEPT. P, 210 W. WASHINGTON SQUARE, PHILADELPHIA 5, PA.

How one firm proved that Fulton's New Sleeve could lick their Sifting Problem . . .

At a Saving of $2.25 a Thousand Bags!

BY J. FRANK GREELEY
Director of Multiwall Paper Bag Sales
Fulton Bag & Cotton Mills

They Had to be Shown. Sifting could make a big profit-and-loss difference in this company's operation. Fulton's new Ful-Flex Non-Sifting Sleeve looked different and promised new economies. They tried it out.

Comparison Showed that Fulton's Ful-Flex Sleeve was of extra size, and made of special flexible paper. They tested it thoroughly. First...

Actual case history in our files—name on request.

They Tested for Sifting on the conveyor belt. Careful scrutiny of the floor area underneath showed no significant sifting had developed. What would happen during shipping? They checked . . .

A Double Check at point of arrival was made. Floor of freight car showed barely perceptible sifting had taken place. Weigh test proved sifting loss had been negligible . . . at a saving of $2.25 a thousand!

Fulton
BAG & COTTON MILLS

ATLANTA • CHICAGO • DALLAS • DENVER • KANSAS CITY
LOS ANGELES • MINNEAPOLIS • NEW ORLEANS • NEW YORK
OKLAHOMA CITY • PHOENIX • ST. LOUIS • SAN FRANCISCO
SAVANNAH • WINTER HAVEN

Let's investigate whether Ful-Flex sleeve can solve a problem for you.

GENERAL SALES OFFICE
FULTON BAG & COTTON MILLS
P. O. Box 198, New Orleans 3, La.

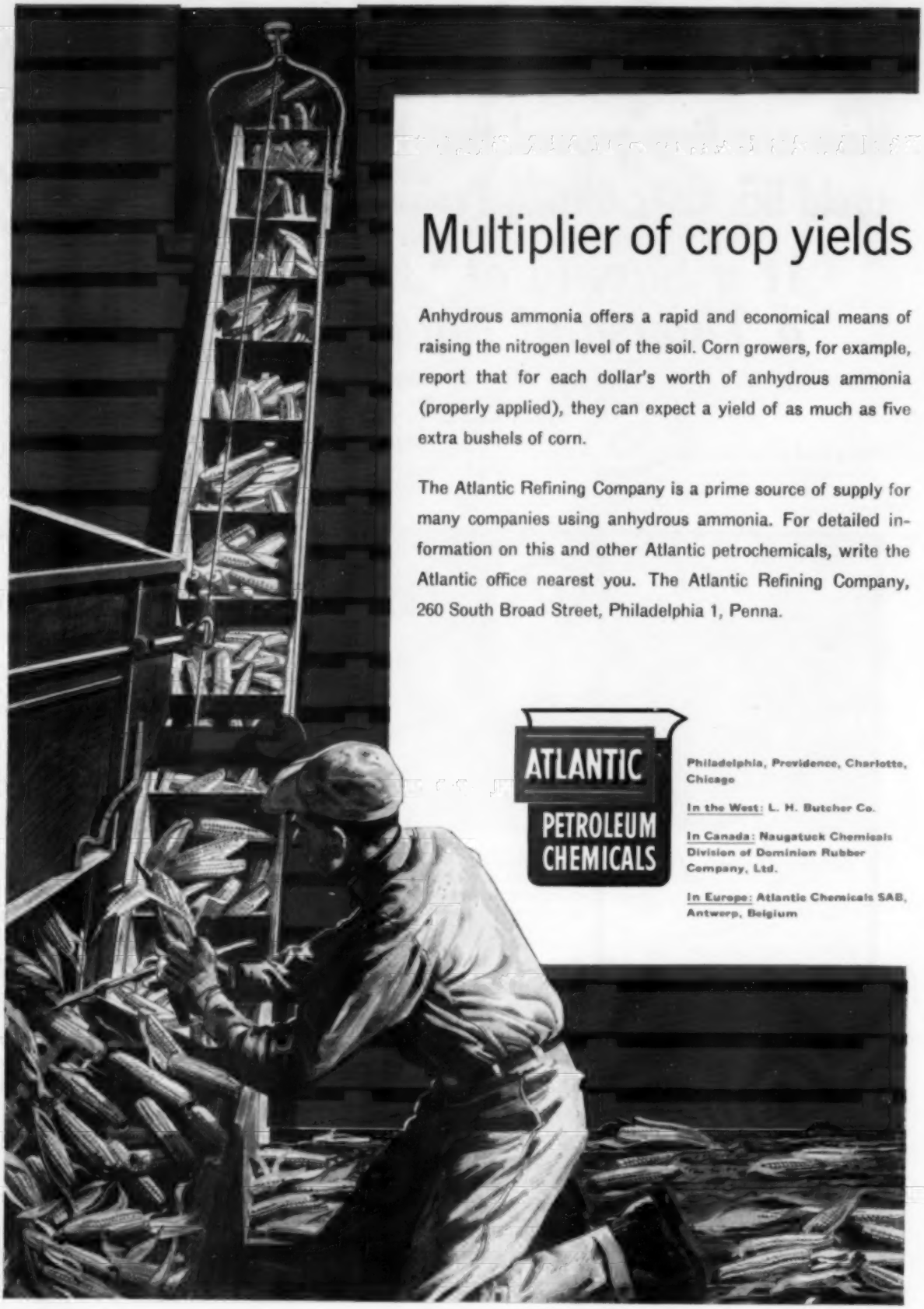
We have a sifting problem in packing _____
(Please feel free to write Fulton full details in complete confidence)

Name _____

Company _____

Address _____

Please write ☐ Have representative call ☐



Multiplier of crop yields

Anhydrous ammonia offers a rapid and economical means of raising the nitrogen level of the soil. Corn growers, for example, report that for each dollar's worth of anhydrous ammonia (properly applied), they can expect a yield of as much as five extra bushels of corn.

The Atlantic Refining Company is a prime source of supply for many companies using anhydrous ammonia. For detailed information on this and other Atlantic petrochemicals, write the Atlantic office nearest you. The Atlantic Refining Company, 260 South Broad Street, Philadelphia 1, Penna.

ATLANTIC
PETROLEUM
CHEMICALS

Philadelphia, Providence, Charlotte, Chicago

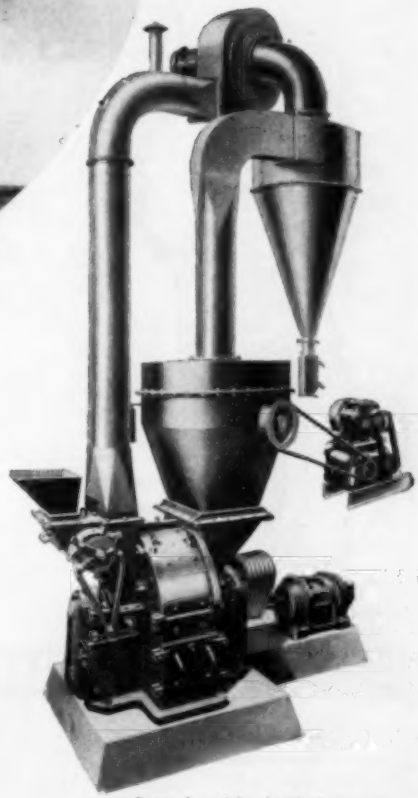
In the West: L. H. Butcher Co.

In Canada: Naugatuck Chemicals Division of Dominion Rubber Company, Ltd.

In Europe: Atlantic Chemicals SAB, Antwerp, Belgium

Uniform Field Strength Insecticide Dusts

DDT - BHC
TOXAPHENE
AND OTHER
FORMULAS



equipped with built-in
RAYMOND IMP MILL
Whizzer Air Separator

...produced at low cost by the Raymond Imp Mill

Operating records of many Raymond installations definitely prove the economy of Whizzer-equipped Imp Mills for uniformly pulverizing and intimately blending field strength insecticides.

The finished products are made directly from the organic technical material in a clean, dustless, automatic system that insures the finest grades with a minimum of supervision.

Whizzer air separation provides for wide range classification, and it is readily set to deliver any desired fineness by a single adjustment from the outside while the mill is running.

Raymond Mills have won steadily increasing acceptance in the insecticide industry due to their many advantages:—ease of installation to fit any plant layout, simplicity of control and operation, economy in service and maintenance.

For complete details, write for Bulletin #68.

COMBUSTION ENGINEERING, INC.

1314 NORTH BRANCH ST.
CHICAGO 22, ILLINOIS

Raymond Division

SALES OFFICES IN
PRINCIPAL CITIES

Combustion Engineering-Superheater, Ltd., Montreal, Canada

Meeting Calendar

Nov. 2-3—Pacific Northwest Plant Food Assn. Pilot Butte Inn, Bend, Oregon.

Nov. 3-4—Northeastern Division American Phytopathological Society, Springfield, Mass.

Nov. 4 — Fertilizer Section, South Carolina Annual Accident Prevention Conf., Hotel Francis Marion, Charleston, S. C.

Nov. 7-8—California Fertilizer Assoc., Mark Hopkins, San Francisco.

Nov. 8-10—New York State Insecticide Fungicide Meeting, Cornell University, Bibbins Hall, GLF Exchange, Ithaca, N.Y.

Nov. 9-10 — Oregon Weed Conference, Senator Hotel, Salem, Ore.

Nov. 14-15—Commercial Chemical Development Association and Chemical Market Research Association. Carter Hotel, Cleveland, Ohio

Nov. 16 — Pesticide Dealers Conf. Rutgers, New Brunswick, N.J.

Nov. 16-17 — Ohio Pesticide Institute, Fort Hayes Hotel, Columbus.

Nov. 21-22—Eastern Branch, ESA, Lord Baltimore Hotel, Baltimore.

Nov. 28-29 — Oklahoma Plant Food Assn., Memorial Union, Stillwater, Okla.

Nov. 28 - Dec. 1 — Entomological Society of America, Annual Meeting, Netherlands Plaza, Cincinnati.

Dec. 5-7 — Chemical Specialties Manufacturers Assn. Roosevelt Hotel, New York City.

Dec. 5-9 — Exposition of Chemical Industries, Convention Hall, Philadelphia.

Dec. 5-7 — Agricultural Ammonia Institute, Kansas City, Mo.

Dec. 6-8 — North Central Weed Control Conference, Omaha Civic Auditorium, and Hotel Fontenelle, Omaha, Neb.

Dec. 15-16—Beltwide Cotton Production Conference, Hotel Peabody, Memphis, Tenn.

Dec. 28-30 — American Phytopathological Society of America, Biltmore Hotel, Atlanta, Ga.

Dec. 29th — American Association for the Advancement of Science, Municipal Auditorium, Atlanta, Ga.

Jan. 4-6—Weed Society of America, Hotel New Yorker, New York City.

Jan. 10-11—North Carolina School, North Carolina State College, Raleigh, N. C.

Jan. 11-12—Wisconsin Insect Control Conference with Industry, Lorraine Hotel, Madison, Wisc.

Jan. 16-17—Annual Arborists School, New York State Arborists Association and State University of New York, Hotel Onondaga, Syracuse, N. Y.

Jan. 16-18 — N. W. Vegetable Insect Control Conf., Imperial Hotel, Portland, Ore.

Jan. 18-20 — Western Cooperative Spray Project, Imperial Hotel, Portland, Ore.

Jan. 24-28 — Midwestern Garden Supply Trade Show, International Exposition Hall, Chicago.

Jan. 26-27—Custom Spray Operators' Training School, University of Illinois, Illini Union Ballroom, Urbana, Ill.

Jan. 27 — Colorado Agricultural Chemicals Association, joint meeting with Colorado A & M College, Cosmopolitan Hotel, Denver, Colo.

Jan. 30-Feb. 3—Illinois Pest Control Operators, Purdue University, Lafayette, Ind.

Feb. 6-8 — Cotton States Branch of the ESA and Southern Agricultural Workers, Biltmore Hotel, Atlanta.

Feb. 7-9 — N. Y. Garden Supply Trade Show, Kingsbridge Armory, New York City.

Feb. 15-17—California Weed Control Conf., Sacramento & Davis, California.

March 28-30—North Central States Branch of ESA, Purdue Memorial Union, Lafayette, Ind.

"bum's rush" for bugs

Confronted with modern insecticides, bugs can only "hit the road." To assist formulators in giving insect pests the bum's rush, Neville offers its readily available NEVSOLVS. These high-boiling, uniform solvents promote ease of formulation at low cost.

Write for samples today.

NEVILLE AROMATIC SOLVENTS

NEVSOLV 200		NEVSOLV 30
195°C (383°F) to 280°C (536°F)	Boiling Range	130°C (266°F) to 190°C (374°F)
.890 to .915	Specific Gravity	.835 to .845
Straw	Color	Water White

NEVILLE

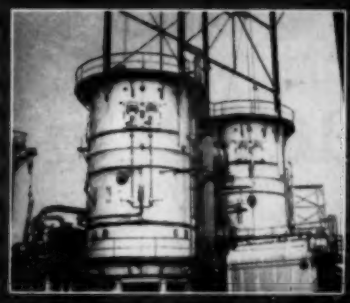
These NEVSOLVS are active solvents for DDT, BHC, 2-4-D esters, etc. Especially clean, good odor. Each grade has individual characteristics but other boiling ranges are available.

NEVILLE CHEMICAL CO. • PITTSBURGH 25, PA.

Plants at Neville Island, Pa., and Anaheim, Cal. AC-3

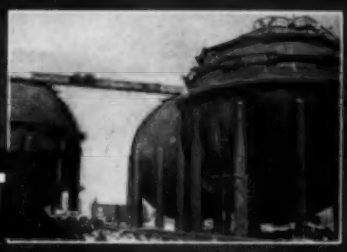
These progress pictures, made in August, show portions of Escambia Bay Chemical Corporation's nitrogen plant now nearing completion at Pensacola, Florida

ON SCHEDULE



Primary gas reformer units which are the heart of the process where natural gas is cracked to hydrogen.

Gas purification section where the main gas stream is freed of carbon dioxide and carbon monoxide in order to insure feeding a pure nitrogen-hydrogen gas stream to the converter.



Three storage spheres, with a total capacity of over 6,000 tons of anhydrous ammonia.

ESCAMBIA BAY

ESCAMBIA BAY CHEMICAL PLANT

Nitrogen materials for agriculture and industry will be available from the Escambia Plant which will provide complete nitrogen production for the Southeast. Products will include anhydrous ammonia, ammonium nitrate, nitrogen solutions and nitric acid.

Escambia Bay Chemical Corporation is owned by United Gas Corporation, Electric Bond and Share Company and National Research Corporation.

Please address communications to

ASHCRAFT-WILKINSON CO.

Exclusive Distributors

Atlanta, Georgia

DISTRICT OFFICES

Norfolk, Va. • Charleston, S. C. • Tampa, Fla. • Jackson, Miss. • Columbus, Ohio

Will you accept an invitation?

We invite you to make a simple test that will let you decide conclusively about the quality of multiwall bag printing that we furnish.

(And remember the sales value of a well-printed brand.)

Here's all you need to do:

❶ Go to your empty bag storage and pick out a half-dozen Bemis-made bags at random... select them from various bales. Then do the same with any other makes of bags you may have with your brand.

❷ Show the bags to a number of people—your customers, your salesmen, your banker, *anyone*—and ask them to pick out the bags with the *better printing* of your brand.

Try the test. Convince yourself.

Bemis BEMIS BAG CO.

General Offices—St. Louis 2, Mo.
Sales Offices in Principal Cities

your eye tells you why

International's New Triple Superphosphate assures more

complete ammoniation

ONE look shows you why International's new Triple Superphosphate offers such a big advantage in ammoniation. Its improved fineness of texture; uniform, dust-free particles; and correct chemical structure assure maximum ammoniation in minimum time — help cut your manufacturing costs. International's new Triple Super is made by an improved process from high quality rock. Result: a high analysis product (46% A.P.A. or better). Special conditioning before shipment helps prevent setting up en route. This, plus improved particle size, means less grinding before mixing, more economical handling, better texture in your finished products and high product performance. International's new Triple Super is ready for immediate delivery to your plant. Write or wire the Phosphate Chemicals Division for samples and quotations.

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

The Nation's Largest Producer of Phosphates • *General Offices: 20 North Wacker Drive, Chicago 6*

Sturtevant Leadership in Fertilizer Granulation...

3 PLANTS COMPLETED

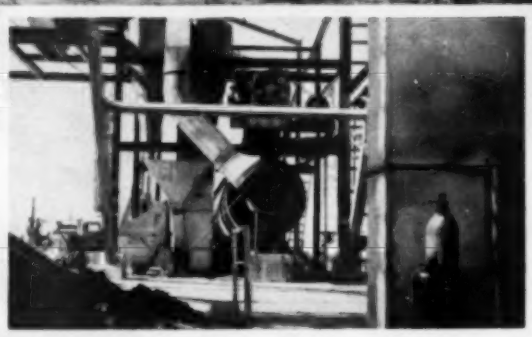
One of the new Sturtevant granulation plants located in El Paso, Texas.

Two plants completed in Texas . . . one in Canada prove Sturtevant leadership in plant design, manufacture of equipment, and supervision of construction for the granulation of mixed fertilizer.

These new plants incorporate all the latest techniques and equipment *for economically* manufacturing granular fertilizer.

A recognized leader in the industry, Sturtevant Mill with its vast fertilizer manufacturing experience and know-how can effect operating economies for you.

Whether you plan to build a new plant, modernize or buy new equipment, it will pay you to consult Sturtevant Mill. Our engineers, specialists in fertilizer manufacture, are available for consultation. Ask for their services, today. You will keep ahead with Sturtevant.

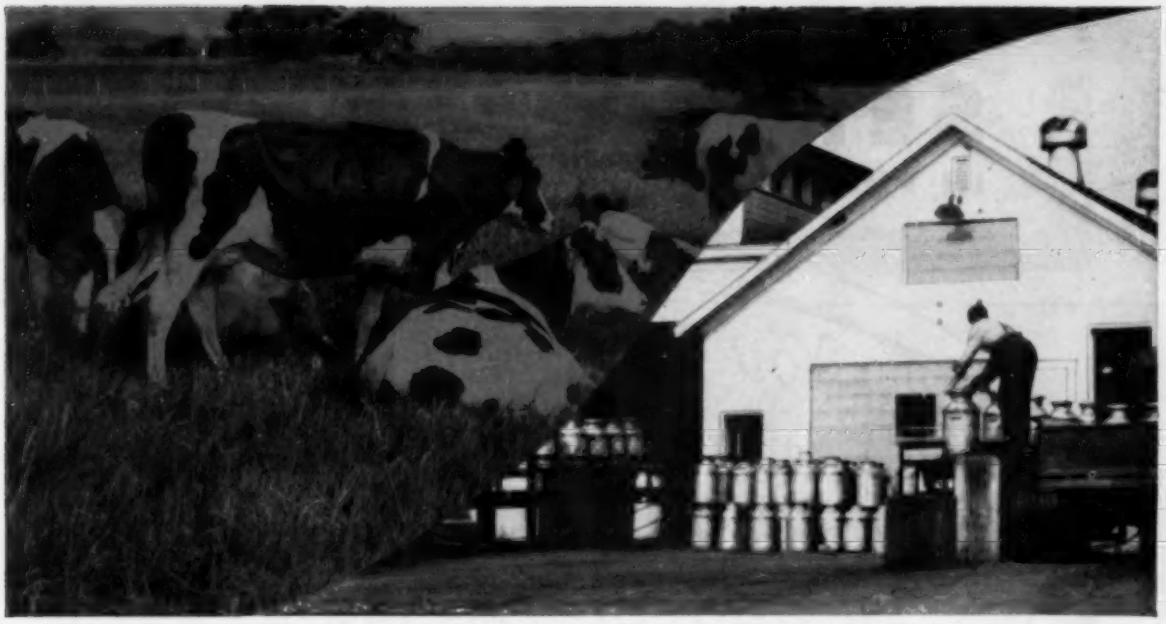


Sturtevant granulator and associated equipment for manufacturing granular fertilizer.

STURTEVANT MILL COMPANY

123 CLAYTON STREET, BOSTON 22, MASSACHUSETTS

DESIGNERS OF COMPLETE PLANTS AND MANUFACTURERS OF: CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS • MECHANICAL DENS AND EXCAVATORS • ELEVATORS • MIXERS



Sell dairymen EXTRA MILK PRODUCTION *with* CRAG Trade-Mark *fly repellent . . .*

It's a fact—cows protected from biting flies give as much as twenty per cent more milk every day! Show dairy farmers how to realize this extra profit, and increase your profits, too, by selling formulations based on CRAG Fly Repellent.

Flies cause lower milk production in three ways: they cause cows to use energy in fighting off flies; severe attacks drain up to three ounces of blood from a cow in a single day; cows lose valuable grazing time and take in less food while under fly attacks.

Earn more profits by selling dairymen protection for their cows—take advantage of this effective repellent.

CRAG Fly Repellent . . .

- *repels all biting flies that attack cattle.*
- *improves the performance of pyrethrins, allethrin, and methoxychlor.*
- *is chemically stable and non-corrosive.*
- *is a coupler and solvent for many insecticidal ingredients.*
- *can be used in a variety of formulations.*
- *is safe to use on cattle.*

Complete information on CRAG Fly Repellent for use on dairy or beef cattle is yours for the asking—just fill in and mail the coupon.

CRAG Trade-Mark

AGRICULTURAL CHEMICALS

CARBIDE AND CARBON CHEMICALS COMPANY

A Division of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

"Crag" is a registered trade-mark of Union Carbide and Carbon Corporation

CARBIDE AND CARBON CHEMICALS COMPANY
30 East 42nd Street, New York 17, N. Y.
Room 328, Dept. D

Please send me technical information on:

☐ CRAG Fly Repellent
☐ Emulsifiable Concentrates
☐ Back-Rubber Concentrates
☐ Oil Sprays
☐ Pressurized Sprays

I am interested in formulations for:

☐ Dairy Cattle
☐ Beef Cattle

Name_____

Company_____

Address_____

SERVICE
IN PHOSPHATE ROCK . . . . . .

You can count on Cyanamid for fast, efficient, unusually flexible service in PHOSPHATE ROCK FOR ACIDULATION

Our aim — to provide the quality of rock you need, when you need it, at lowest cost. Here are some of the services we provide for every customer . . .

Quality control — Each step in phosphate rock production is carefully followed by trained chemists, right down to the last sampling of each car that leaves the plant.

Prompt, efficient follow-through on orders— Trained personnel *at the point of shipment*—Brewster, Florida—process every order with an absolute minimum of delay to assure that your order conforms with your requirements.

Technical service in your own plant — Every Cyanamid phosphate customer has at his disposal the services of trained technical specialists to help solve any problems that may arise about acidulation or other use of phosphate rock.

CALL ON CYANAMID FOR:

Washed and Dried Florida Pebble Phosphate Rock, available in many grades: 77/76%, 75/74%, 72/70% and 68/66% BPL.

Ground Phosphate Rock in same grades, ground to acidulators' requirements.

We will welcome the opportunity to serve you.

AMERICAN Cyanamid COMPANY

AGRICULTURAL CHEMICALS DIVISION

30 Rockefeller Plaza, New York 20, N. Y.

Producers of:

AERO® Cyanamid: Fertilizers—Defoliants—Herbicides
AEROPRILLS® Ammonium Nitrate Fertilizer
AERO® Ammonium Sulphate
ANHYDROUS AMMONIA
PHOSPHATES for Acidulation and Direct Application
THIOPHOS® Parathion Technical
MALATHION Technical
CYANOGAS® Calcium Cyanide Fumigants
HCN Fumigants
POTASSIUM CYANATE Weedkiller for Agriculture and Turf

Editorial
COMMENTS

THE hot topic in the insecticide business right at the moment is the question of whether or not the boll weevil is actually, as suggested by two Louisiana entomologists, developing resistance to chlorinated hydrocarbon insecticides. These investigators (See pgs. 64-65) found that over the past season, at least in certain Louisiana areas, growers had failed to obtain control of boll weevil with repeated applications of chlorinated hydrocarbon insecticides, and from these findings they draw the conclusion that weevils "have developed a high degree of resistance to these insecticides."

Before we start pitching out all the modern style insecticides, however, and going back to calcium arsenate, let us add that the other states in the cotton belt do not necessarily agree with the Louisiana findings. A report from Texas says "we have no information which would lead us to believe we have boll weevils resistant to the chlorinated hydrocarbons in this state." Another investigator points out that in big weevil years "there are always individual farmers who make a failure of weevil control." Another observer who has just returned from a last minute inspection of control results throughout the cotton area says he believes the Louisiana findings "are based on wholly inadequate data."

There are strong and numerous arguments contradicting the Louisiana findings. It is pointed out that really unusual growing conditions existed this past season, and that in some cases populations as high as 500,000 weevils per acre were encountered in localized "hot spots." Even with 98% control in such areas, the survivors could still decimate a cotton crop. The comment is offered that in some of the heavily infested areas control efforts were not started at an early enough date, and data is cited dating back to the late forties demonstrating that late season control of the boll weevil has always presented a difficult problem.

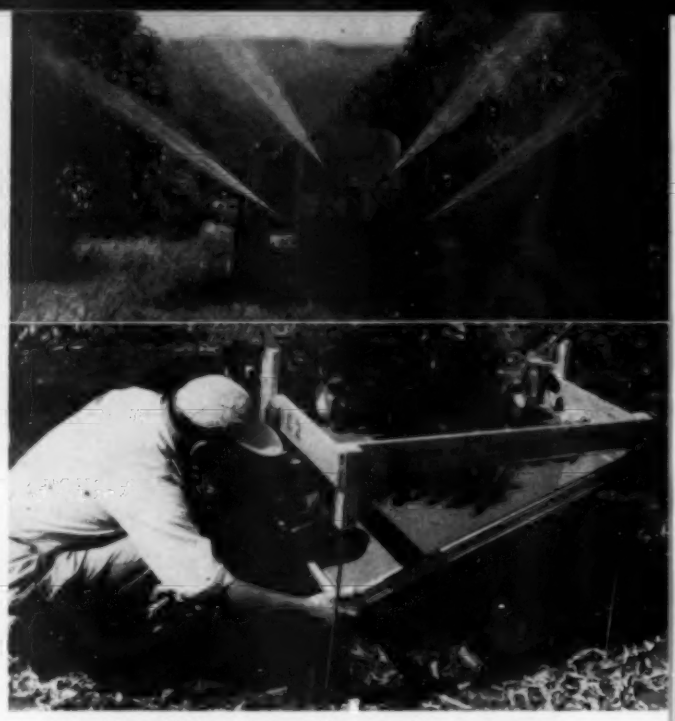
Is resistance truly developing, or was it rather a situation in which tremendous weevil populations were encountered in an unusual crop year, and the problem of control attacked by wrong methods and poor timing? Chances are we will not know the real answer until next spring, but we predict in any case a rather hectic cotton control session in Memphis in December.

IN an honest . . . and successful venture to coordinate and improve fertilizer manufacture and operation, a group known as the Fertilizer Round Table has been holding meetings for five years . . . the most recent in Washington on October 11-12 (see story, page 35-36). Dr. Vincent Sauchelli, who organized the first and each succeeding meeting, has made a definite attempt to keep the group small, but as word got around of the quality of material discussed, and cooperation of guests in exchanging information, attendance increased steadily. This most recent session saw a registration of more than 150 representatives of industry coming from all over the U. S. and Canada. The distribution of this attendance is interesting, since it shows that 28 of the group were "small company" representatives, 80

(*Continued on Page* 102)

Bait Sprays FOR FRUIT FLY CONTROL

By Loren F. Steiner
Entomology Research Branch
Agricultural Research Service, U. S. D. A.
Honolulu, Hawaii



Top Photo: With cable-controlled cut-off valve one man is applying protein hydrolysatemalathion bait spray to alternate middles in a large mango orchard at the rate of 20 acres per hour.

Lower Photo: Tray method for evaluating bait-spray formulas against wild flies. Flies attracted and killed by deposits on guava foliage are counted and removed at intervals from the lower tray.

DANGEROUS species of tephritid fruit flies from subtropical areas around the world pose a constant threat to American agriculture. The ever-increasing speed and volume of air travel, both civilian and military, and the growing tourist interest in areas outside the continental United States tend to increase the hazard that one or more of these pests may be introduced, despite careful quarantine safeguards.

The current Mediterranean fruit fly outbreak in Costa Rica is the first known reappearance of this pest on the North American continent since the incipient outbreak in Florida was eradicated in 1929. The Mexican fruit fly, found in 1954 along the Mexico-California border, and now the object of an intensive eradication campaign, further illustrates the growing danger of fruit fly introductions. The oriental fruit fly, melon fly, and Mediterranean fruit fly infestations in Hawaii are only 8 hours by commercial airline from California, and 16 hours from Florida. Obviously, it is very important that mainland authorities and growers have available for immediate use effective means of control or eradication, if any new fruit fly outbreak occurs there.

Protein hydrolysate-organic phosphorus bait sprays, as developed at the Department of Agriculture's Honolulu Laboratory (Steiner 1952, 1954, 1955), have controlled effectively heavy infestations of all the fruit flies in Hawaii at costs of 2 to 5 per cent of the crop value. After preliminary tests at the Mexico City laboratory had proved them effective against the Mexican fruit fly (Shaw 1955), they were adopted for use in the current eradication campaign along the Mexican border.

New Insecticides Effective Baits

BAIT sprays have long been used in the Old World for controlling fruit flies, though they have not been very successful. The development of parathion and other organic phosphorus insecticides by the chemical industry was a necessary prerequisite to the current interest in bait sprays. Unlike the older insecticides, such as lead arsenate, sodium fluosilicate, and tartar emetic, used with sugar or molasses solutions, these new phosphorus compounds are very quick-acting, particularly when ingested. Their rapid action and high toxicity increase the probability that flies will consume a lethal dose before their appetite is satisfied, and that they will succumb before they can free themselves of the toxicant by regurgitation or defecation. Sugar and molasses are low-grade attractants for fruit flies, and their addition to the new insecticides in field tests in Hawaii failed to improve control. Too often, the sugar reduced residual toxicity by affecting the physical nature of deposits on foliage and fruit.

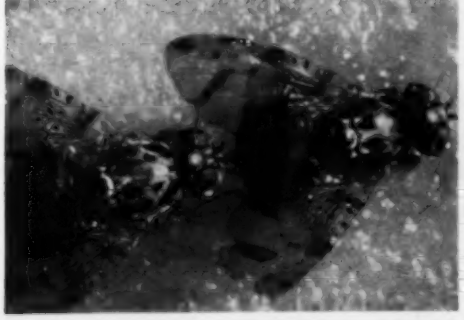
A second discovery of great importance was made in 1950 during the development, by Finney (1953) and Hagen (1953), of methods for the mass production of fruit flies. Hagen demonstrated that certain enzymatic hydrolysates of yeast protein contain nutrients (various amino acids) that are essential to maximum fecundity in the oriental fruit fly, and that an enzymatic soy hydrolysate, when fed to the males, also provides an important fertility factor, thought to be a vitamin. He also found that honeydew secreted by the citrus mealybug stimulates a level of egg production and hatch similar to that obtained with the artificial diets, and concluded that the honeydew contains carbohydrates, vitamins, and the essential amino acids.

Investigations have since indicated that honeydew from the green scale, aphids, and mealybugs or the microflora developing on the honeydew may have a similar effect. Flies fed solely on sugar, fruit juice, and water failed to reach sexual maturity in less than 3 weeks and even then laid few or no eggs. Upon addition of the hydrolyzed proteins to the diet, sexual maturity was attained in 8 or 9 days, and heavy egg production resulted. This finding suggested that hydrolyzed proteins might attract flies under field conditions if sprayed on the foliage. Tests beginning in 1950 proved this to be true. Since then, hundreds of formulas with both acid and enzymatic protein hydrolysates from many sources have been tested. Many have been found effective against all three Hawaiian species of fruit flies, particularly the females. New hydrolysates more attractive than those originally used have been found. Soy hydrolysate was considerably less effective than the yeast hydrolysates and has not been recommended.

Top Photo: Oriental fruit flies attacking mango fruit.

Center Photo: Mediterranean Fruit Fly infestations in peaches. A single, unsprayed peach may contain as many as 100 larvae.

Bottom Photo: Adults of the Mediterranean fruit fly.



At first, malathion was found to be slightly repellent, and parathion was the preferred toxicant until 1954, but since then, improved formulations of malathion have given just as good results. In Hawaii, malathion has recently been approved for use with protein hydrolysate on mango, guava, and passion fruit up to two or more days before harvest (Steiner 1954).

DDVP, Diazinon, Bayer 13/59, Bayer 17147, and Chlorthion were all less effective than malathion or parathion for use in bait sprays. Dow ET-15, another phosphorus compound, was more effective against the oriental fruit fly, but it reduced melon fly attraction. Chlorinated hydrocarbons failed to show any improvement in performance when combined with protein hydrolysates. Tartar emetic-sugar baits were also less effective than the protein hydrolysate bait sprays.

Both malathion and parathion wettable powders were superior to emulsifiable concentrates for bait-spray use. Each toxicant outlasted the protein hydrolysate on foliage.

Hydrolysate Attractants

SEVERAL effective hydrolysates are available for use in bait-sprays. Enzymatic formulations, which have been utilized in most field tests and are in present use commercially, include yeast hydrolysate (Nutritional Bio Chemicals Co.) and partially hydrolyzed yeast protein (Marvin R. Thompson Co.), both manufactured from brewer's yeast. Effective acid hydrolysates include one derived from corn protein, designated Sauce Base No. 2 (A. E. Staley Mfg. Co.). This product contains 15 per cent sodium chloride, which acts as a preservative. As a very low-cost liquid (52 per cent solids) hydrolysate, it has equaled the enzymatic forms when compared on an equal-solids basis; however, it is phytotoxic to some fruit fly hosts. It has been used with safety on mango and guavas at up to 2 quarts per acre, but not on passion fruit. Several new enzymatic and acid hydrolysates now being tested appear more attractive than any of those mentioned above. More effective formulas are certain to be developed.

Recent tests have shown that the acid and enzymatic protein hydrolysates that have proved effective in bait-spray formulas provide the necessary nutrients to insure maximum fecundity. The unhydrolyzed brewer's yeast was ineffective as an attractant in malathion or parathion formulas, and it was of no observable benefit to adult flies when included in their diet. These results indicate that entomologists attempting to develop baits or bait-sprays for insect control might profitably precede their investigations with studies of the nutritional requirements of the pests concerned. This would apply only to insects that require extended feeding periods before oviposition can take place.

Development of Bait-Spray Formulas

DURING the last five years, experiments have been conducted to improve the bait-spray formula. Since the usual laboratory or field-cage methods were not possible with the Hawaiian species, a tray technique (Steiner 1952) was adopted. Trays 3 feet square are suspended under guava terminals to each of which 5 to 10 ml. of bait spray is applied, and the number of flies caught on the trays provides the means for evaluating the treatment. This method truly reflects attraction, since the toxicants alone rarely drop flies on the trays, whereas bait-spray formulas often attract and kill more than a million per pound of protein hydrolysate.

A 25 per cent malathion wettable powder, and the protein hydro-

lysate may be combined in a 5-to-1 ratio, but parathion at more than 2 to 1 reduces the attractiveness. Wider ratios may sometimes be useful, however, since loss of attraction would be offset by increased kill of flies that do not feed. In most tests, sugar had no effect on oriental fruit fly control when added to the protein hydrolysate formulas containing malathion or parathion, but it significantly reduced their effectiveness as melon fly attractants.

Most fungicides decreased the efficiency of bait sprays. Tribasic copper sulfate destroyed all attraction, and bait sprays applied over 2-week-old residues of this fungicide were reduced 65 per cent in effectiveness. Other fungicides with less harmful but adverse effects include captan, maneb, ziram, nabam, ferbam, and to a lesser degree the newer antibiotics. Since these materials did not depress the toxicity of the deposits to flies contacting them, they are believed to inhibit the growth of attractive microflora on the protein residues.

In general, the protein hydrolysates do not function well when dissolved in water and used as liquid baits in traps. Likewise, the best attractants in traps are useless in bait sprays.

Prior to and concurrent with the development of bait sprays, extensive field tests were made of all available insecticides in conventional spray applications on several fruit and vegetable crops. Because fruit flies generally concentrate their attack on ripening fruit during the long harvest period, the maintenance of adequate deposits without exceeding safe residue levels was difficult, if not impossible.

Methods of Application

THE dosage usually found adequate for the protection of fruit crops was ½ pound of protein hydrolysate and 1 to 2 pounds of malathion or parathion per acre, applied at weekly intervals, or twice those amounts applied biweekly, in 5 to 150 gallons of water, depending upon the type of equipment used.

To obtain 95 to 100 per cent control of Mediterranean fruit fly infestations averaging 200 to 300 larvae per pound of ripe picked peaches, it was found necessary to apply as much as 1 ounce of protein hydrolysate and 3 ounces of 25 per cent malathion wettable powder in 1 gallon of water per mature tree at weekly intervals. The trees on which these tests were made were in groups of one to six on widely scattered properties, and subject to continuous fly invasion. Small fruit and vegetable plantings subject to reinfestation by sexually mature migrating females of any of the fruit fly species will usually require heavier or more frequent applications until the gravid female population in the surrounding community has been greatly reduced.

Good distribution of the spray deposits improved performance, but complete coverage was found unnecessary. Where several acres were involved, good control was obtained by spraying only one side of orchard-tree rows with wind-drifted mists or well-fogged concentrated sprays, in swaths up to 100 yards wide to leeward of the sprayer. Coarse sprays spattered over the trees at low pressure also gave excellent results. Bait-spray deposits after drying continued to attract and kill flies for 1 to 3 weeks, depending upon rainfall. Precipitation in excess of 1 inch usually reduced their efficiency. In dry seasons, light showers temporarily improved performance. Attractiveness was greatest when the deposits first dried.

The distance of attraction of protein hydrolysate bait sprays is unknown, but probably shrinks considerably after the first few days. In one passion fruit field, the application of partially hydrolyzed yeast protein-malathion bait spray to 40 rows of a 56-row (5-acre) vineyard resulted in complete evacuation of fruit flies from 4- and 8-row unsprayed plots within 3 hours, where the prespray population approximated 6,000 flies per acre. The protein hydrolysate odor can be detected by man ½ mile or more to leeward of sprayed areas. We have observed infestation declines lasting several days in an unsprayed mango orchard after sprays were applied to a 35-acre orchard 1 mile to windward.

The bait sprays applied to strips or borders do not act as insurmountable barriers to fly movement. They do not exert a continuous attraction to all flies in their vicinity. Some flies may be intent on ovipositing, and others may have fed well before arrival and remained unresponsive for several hours.

Advantages of Bait Sprays

THE most important advantage of the protein hydrolysate bait sprays is that by inducing a feeding response, they require far less toxicant to kill the fly than where contact or residual toxicity must be depended upon. For example, where a bait spray containing parathion-protein hydrolysate was applied biweekly at rates of 1 to 8 pounds of 25 per cent wettable powder per acre, infestation reductions of 93 to 100 per cent were obtained in 13 of 21 field tests. Parathion alone rarely gave more than 90 per cent control when less than 10 pounds of the 25 per cent wettable powder was used per acre, although it was the outstanding fruit fly insecticide. Infestations in unsprayed fruit ranged from 2 to more than 100 larvae per pound.

Present tolerance levels would prohibit the use of sufficient parathion and most other toxicants in nonbait spray formulas close enough to harvest to control flies attacking ripening fruit. Reduced hazards to spray operators, orchard workers, and consumers of fresh fruits and vegetables are important advantages of bait sprays.

Because lower application rates are required than where conventional sprays are used, and because the bait sprays are unattractive to fruit fly parasites and pollinating bees, they rarely harm these beneficial insects.

Attacks by ovipositing oriental fruit flies and melon flies are often severe enough to cause continuous dropping of newly set passion fruit and effect complete crop failure in this rapidly expanding new Hawaiian industry. Some of the heaviest fly attacks in the islands have been controlled sufficiently with bait sprays containing 1 pound of protein hydrolysate and 3 pounds of 25 per cent

(*Continued on Page* 113)

AMMONIATION AND GRANULATION . . . theme at Fertilizer Round Table

MORE than 150 manufacturers and industry representatives registered at the fifth annual meeting of the Fertilizer Round Table, which has been organized and presented each year by Dr. Vincent Sauchelli, chief agronomist for Davison Chemical Co. This year's meeting, held Oct. 11-12 at the Sheraton-Carlton Hotel, Washington, D. C., featured discussions on ammoniation and granulation . . . the processes, equipment, and related factors involved. A particularly interesting note in attendance was the representation of industry: 25 per cent small company representatives; 25 per cent manufacturers; and 50 per cent, staff of large companies. Some 5 members of government were represented, and 4 Canadians.

The meeting opened with a general report on the theories of granulation by John Hardesty, U. S. Department of Agriculture, Beltsville, Md. Mr. Hardesty presented an outline of granulation, and specifications for the *ideal* granular product. Mr. Hardesty cautioned his listeners that agglomeration is one of the first difficulties to be prepared for in granulation. In developing this point, he showed figures whereby yield increases as moisture is increased . . . until the agglomeration point is reached, at which moisture content, yield falls off sharply. As a result, he said, it is necessary to limit the initial input of water to considerably below the agglomeration point; (2) avoid leaving high analysis fertilizers for too long a period open to the atmosphere . . . and, in general, keep a close watch of the water content of the product.

The following are specifications he suggested for the *ideal* granular product:

1. *Particle size;* 10-14 Tyler Standard Mesh. (Final product).
   (a) A particle large enough to resist setting and caking.
   (b) A particle small enough to be uniformly distributed at low application rates—*i.e.*, each plant location in the soil to receive an adequate number of particles.
   (c) Agronomically efficient.
   (d) Within the particle size range of that now manufactured.
2. *Particle shape;* spheroidal.
   (a) Least number of contacts between particles gives maximum resistance to setting and caking.
   (b) Maximum free-flowing quality.
   (c) Minimum surface for covering with coating agents.
3. *Particle structure;* 95% of the particles to remain intact under a mechanical pressure of 100 lbs./sq. in.
   (a) Sufficient hardness to withstand normal storage and handling.
4. *Homogeneity;* each granule up-to-grade.
5. *Moisture-absorbing rate;* product to maintain its original uniform drilling rate for 1 hour under atmospheric conditions of 88% relative humidity and 76° Fahrenheit.
6. *Fertilizing efficiency;* optimum delivery of nutrients to the growing plant.
   (a) Availability and water-solubility of nutrients must be geared to requirements of crop and soil.
   (b) To agree with future research.

Some of the featured speakers at the Fertilizer Round Table (l to r) J. Hardesty, USDA: A. J. Sackett, Jr., A. J. Sackett & Sons; A. Spillman, Fertilizer Manufacturing Cooperatives, Inc.; W. King, W. S. Tyler Co.; and Vincent Sauchelli, of Davison Chemical Co., organizer and chairman of the Round Table.

Methods and Procedures

GRANULATION and ammoniation methods and procedures developed by the Tennessee Valley Authority were reviewed by T. P. Hignett, who first presented a schematic diagram of the pilot plant at TVA. Mr. Hignett compared use of nitrogen solutions and anhydrous ammonia . . for producing granular fertilizer of 5-20-20 grade. Use of anhydrous ammonia and sulfuric acid gave the best granulation: water had to be added (premixed with the ammonia) for best results. The moisture content of the product leaving the cooler in this trial was about 4.2 percent. When ammonia, sulfuric acid and nitrogen solutions were used

as the nitrogen source, granulation was good and the moisture of the product leaving the cooler was about 2.4 percent . . . considerably lower than in any other trials with 5-20-20. When only nitrogen solutions were used, Mr. Hignett indicated that the results were not too satisfactory, the moisture content was high (13% before and 5% after drying), and the granules were weak and dusty.

In reviewing the extent of ammoniation, Mr. Hignett indicated that ammonia loss was greatly affected by the extent to which granulation is controlled. He pointed out that an oversupply of ammoniating solutions will also result in a high ammonia loss. He presented test production data to illustrate the various points.

Commenting on production of 15-15-15, he indicated that a high amount of phosphoric acid is generally necessary.

Still another observation, resulting from greenhouse test data comparing the effect of particle size of product on average yield of Sudan Grass . . . seemed to indicate that particle size was not an important factor in affecting yield.

Granulation with UAL

IN a discussion of developments in the production of granulated complete fertilizers, Ove F. Jenson, E. I. du Pont de Nemours & Co., advised that "Comparatively little has been done, or even attempted, using urea-ammonia-water solutions. Most of the process development, he said, "as well as the practice to date, has employed ammonium nitrate-ammonia-water solutions, often as the sole source of nitrogen, or supplemented with anhydrous ammonia, ammonum sulfate, sulfuric acid, or phosphoric acid.

"The reasons for the lack of interest in or work with urea are probably twofold. First, urea solutions have had for a considerable period, a somewhat limited production and availability, whereas the current and prospective supply situation of ammonium nitrate solutions, produced by a larger number of manufacturers, and in much larger quantity, has been favorable. With the advent of new urea producers, and with more planned, this condition is rapidly changing.

"A second and almost equally potent reason for the neglect of urea has been the generally held opinion that urea was not a suitable material in the granulating process, because of hydrolysis or decomposition under the high temperatures involved in the ammoniation and subsequent drying processes."

Mr. Jensen explained that tests were made to explore the behavior of urea, to ascertain if hydrolysis was a serious factor; and to determine the granulating characteristics of urea. He then presented test data and results of pilot plant studies and plant scale tests, etc., for specific compounds. On the basis of this work, Mr. Jensen advised that:

(1) Urea is stable in granulating processes involving high temperatures, provided the product is cooled before storage.

(2) Urea solutions afford satisfactory granulation from the standpoint of yield, desirable granule size, hardness of granule, appearance, free-flowing qualities, and comparative freedom from subsequent reactions that may induce excessive pile set or caking in bag storage.

Mr. Jensen observed that from the standpoint of solubilities, urea is close to ammonum nitrate, and therefore affords a good agglomerating and adhesive effect. Only slight modification in formulating might be necessary in some cases to utilize UAL in any process now employing nitrate solutions.

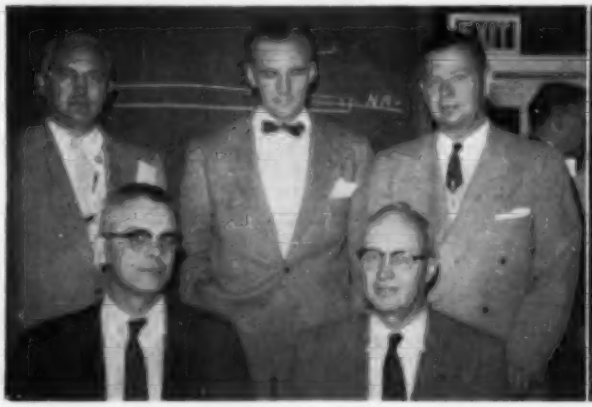
Granulation at FMCI

THE main features of a new granulation installation at Fertilizer Manufacturing Cooperative, Inc., Baltimore, Md., were described by Albert Spillman, who remarked to his listeners that at this time "Granulation is more of an art than a science." He stated that four granular formulas, 10-10-10, 8-16-16, 6-18-18, 6-12-12, are prepared at the new plant, that types of nitrogen solutions used will vary with the formulas desired. Higher nitrogen formulations are no prob-

(*Continued on Page* 102)

(Left Photo) seated: T. P. Hignett, Tennessee Valley Authority, and O. Jensen, E. I. du Pont de Nemours & Co.; standing: G. Halldorson and E. J. Leister, both of E. Renneburg & Sons Co.; and J. C. Sharp, Spencer Chemical Co.

(Right Photo) seated: M. W. Thomas, Thos Alabama Kaolin Co., and E. C. Perrine, Allied Chemical & Dye Corp.; standing: A. Illiff, Blaw Knox Co., R. C. Smith, Eastern States Farmers Exchange; and A. L. Marshall, Olin Mathieson Co.



Some Effects of the MILLER LAW on the U. S. Pesticide Industry

*By Dr. Walter T. Reed**

Haddonsfield,
California Spray-Chemical Corp.

I WOULD anticipate that the main questions occurring to the Canadian Agricultural Chemical Industry at the present time in connection with the new Miller Law would be — How is it functioning in the United States? How has it affected U. S. Industry? How has it affected the agricultural experiment stations and other research and extension agencies? How has it affected the marketing of produce, and how has it affected the public?

We have had an opportunity to observe the answers to some of these questions this past growing and marketing season, and I am glad to say that the Miller Bill has gone into effect with a minimum of disruption of agricultural practices and a minimum of disruption to the orderly marketing of agricultural pesticides, at least for the 1955 season. To date, I know of no serious hardships that have resulted either to industry or agriculture. Naturally, there have been problems, but these have been, for the most part, overcome.

Let us look at some of the problems that have arisen and examine the methods by which they have been solved, and at the same time point out some of the problems with which we are still faced, for which satisfactory solutions must be found. Some of the important effects of the Miller Bill may be listed under the following headings:

(1) The relationship between industry and government. That is, agricultural experiment stations and other government research agencies.
(2) The effect on industrial agricultural chemical research.
(3) Industry's relationship with the food processor.
(4) Industry's relationship with the food producer.
(5) Industry's relationship with the regulatory departments of the government.

(1) In our field we believe that government and industry have a common interest in the development of and the dissemination of sound, practical directions and recommendations for the use of agricultural pesticides. It is the responsibility of industry to provide adequate label directions for the safe and effective use of our products in such a manner that excessive residues will not occur. It is the responsibility of the government agencies to provide and teach the principles of pest control and the proper timing for the use of pesticide chemicals. Consequently, it is my observation that the Miller Bill has brought about a very desirable, closer cooperation between government agencies and commercial companies. This should be mutually beneficial to all parties concerned.

One of the major problems confronting both the government and major industry is a situation that has occurred several times. A rather large repertoire of insecticides and fungicides is available for use in controlling pests on a wide range of crops. On the major crops and the major pests there frequently has been adequate data to establish practical tolerances. However, on many crops, at least for some pests, and new ones keep appearing all the time, while there may be adequate information for satisfactory control of these pests, we lack the specific information such as spray residue levels to establish officially a tolerance and consequently release directions for use. Without a tolerance, industry or the agricultural experiment station cannot give directions for the use of many chemicals for pest control, even where the material has been used satisfactorily for, in some cases, many years, since there may be and frequently is a residue of the chemical on the harvested crop.

Frequently, this same chemical may be used on another crop on which a tolerance has been set. This situation proves very puzzling to the grower and embarrassing to government and industry. In many cases, when you consider the large number of pests and crops grown, the burden of collecting sufficient use data and spray residue data to establish a tolerance appears to be prohibitive in cost and in time. In this instance, perhaps, our regulations have been made too specific and not broad enough for a practical and efficient administration. This problem is being studied by all concerned and we are hopeful that there will be a practical solution.

Complicating this problem is the fact that insect resistance has developed in many cases, and is developing much more rapidly than was anticipated. Established pest control practices that have been adequate are, in some cases, now failing and many more probably will fail in the near future. As Dr. Charles Palm, head of the Department of Entomology at Cornell University, recently stated, "The variable is the pest and up until now, at least, insects and mites seem to have no respect for recommendations." And I might add, they seem to have no respect for regulations, and many are developing a tolerance for specific chemicals or methods of treatment.

The solution or partial solution

*Based on a talk before the 3rd annual meeting of the Canadian Agricultural Chemicals Assn., Ste. Adele, Quebec, Canada, October 14, 1955.

to the above problem is being met by closer cooperation between industrial research and government research agencies with a free exchange of residue data, toxicology data, usage recommendation data and other pertinent information. At least, we feel that we are utilizing to the maximum all of the information available from all sources. This fostering of closer cooperation, in my opinion, can be considered as a definite beneficial effect of the Miller Bill for the public.

One very successful method of meeting and resolving problems common to both industry and government has been to form a liaison committee of technical representatives of industry, actually members of the Technical Advisory Committee of our National Agricultural Chemicals Association, who meet unofficially and informally with members of the U.S. Food and Drug Administration and the Registration Division of the U.S. Department of Agriculture. At times, representatives of other agencies, such as Entomology Research Branch, Animal Industry Branch of the Department of Agriculture, the American Meat Institute and other interested parties have also participated. This committee has been able to discuss all the aspects of the various problems and advise the Food and Drug Administration on various phases of these problems. This has avoided much confusion, simplified procedures and, we feel, has prevented impractical or unworkable regulations.

Operating under the informal tolerance, the normal procedure for studying spray residues was generally to determine the minimum spray residue that a useful spray program would leave, or, to put it in another way, to devise a spray program which would give adequate control and still leave a minimum residue. This enabled industry to register and market the product, even though it did not cover all the fields of usage. With the setting of formal tolerances, this situation has necessarily changed, since any tolerance set must provide for ample leeway, provided the toxicology of the product is favorable for unexpected infestations of pests, unusual weather conditions, etc. And unfortunately, in many cases, residue data available today has been insufficient to show how much of a tolerance was needed. In the future, both government and industrial research should be conducted so as to show the maximum amount of spray residue which may be required for most efficient use of pesticides under unusual conditions, in order to save a crop. This is a complete reversal of practices that have been followed in the past.

(2) The effect of the Miller Bill on industrial research has been very marked. Previous to the passage of this bill, one of the major functions of industrial research might have been described as the synthesis, screening and developing of new pesticides at an ever-accelerating rate. The results of this research are obvious in the large number of new and extremely effective pesticides that have appeared on the market in the last ten years. Since there was a great need for these products, they were quickly tested and adapted for use in the agricultural field.

The provisions of the Miller Bill, however, require that a much greater amount of detailed research relative to the use of these compounds be carried out in order that they may be registered, and a tolerance established for all crops. Much more field research is required to determine the efficiency, plant safety and the amount of spray residue that will be left, under the various conditions under which they will be used, on the crops they are to protect. Extensive chronic toxicology studies must be carried out on at least two groups of warm-blooded animals, which is of course very expensive and time-consuming work. Methods of analysis for spray residue must be developed, and hundreds of analyses must be performed.

Among the more or less unforeseen research problems that have arisen are the correlated problems associated with establishing tolerances on forage crops, grain and other feed crops, meat and milk. The U.S. Food and Drug Administration has taken the stand that no pesticides should appear in milk, since this is the primary food of infants and invalids. This means that any pesticide that is to be used on feed crops of any type must be fed to lactating dairy animals to determine the level at which they can be fed without the material appearing in the milk. At the same time, these crops must be fed to meat animals and the amount of pesticide appearing in various parts of the carcass determined.

At present, no decision has been reached as to which part of the carcass, such as the fat, muscle, bones or organs, must be tested to determine the pesticide level in the meat, or at which time the meat should be sampled. That is . . . in the live animal that is the raw agricultural commodity . . . in the parts of the carcass cut up and sold at retail . . . or in the whole carcass. All these points must be established before a workable tolerance can be set for any feed crops such as forage, grain or fodder, because these are all considered raw agricultural commodities, and the residues on these feed crops must be determined by that required to control the pests as well as a safe level in meat, with no residue in milk. This is a very pressing problem, and requires solution before another growing season.

It is thought by many that the greatly increased expense of developing a new pesticide, and the risk that it may fail to meet the registration and tolerance requirements, will greatly curtail, or at least slow down, the research and development of new compounds. Indeed, this effect has already been observed in the United States. In the past year, some of our larger and more active concerns have discontinued all of their agricultural chemical research. Others have found it necessary to divert the energies of their research staff from productive research to the collection, organization and preparation of data for the meeting of registrations and establishing of tolerances. This is necessary research, but does not produce new pesticides, or advance the technology toward growth and expansion of the industry. This is particularly serious,

(*Continued on page* 100)

New Officers and board of C.A.C.A. for 1956: Seated (l. to r.) A. W. Hutchison, director, E. P. Aikman, 1st vice-pres., R. G. Smith, president, K. B. Owens, 2nd vice-pres., M. E. Ward, secretary, and M. F. Anderson, retiring president and member of the board Standing (l. to r.) P. E. Redman, S. R. Stovel, R. M. Ferguson and J. H. D. Ross, directors, and J. H. Elliott, treasurer and director.

THE third annual meeting of the Canadian Agricultural Chemicals Association was held at the Chantecler, Ste. Adele, Quebec, October 13 and 14. An attendance in the neighborhood of 200, including some thirty or forty representatives from the United States, were present to participate in a 2-day program which centered about two panel discussions—one on use of herbicides and brush control materials, and the other on insecticide tolerances for the Canadian market.

R. G. Smith of Charles Albert Smith, Ltd., Toronto, was elected president of the association for the coming year at the annual meeting which preceded opening of the general program of papers and panel group discussions. He succeeds M. F. Anderson, Dominion Rubber Co., Montreal, retiring president. Serving with Mr. Smith in the executive group for 1956 will be: first vice-president, E. P. Aikman, The Nichols Chemical Co., Ltd., Montreal; second vice-president, K. B. Owens, Monsanto Canada, Ltd., Montreal; secretary, M. E. Ward, DuPont Canada, Ltd., Toronto; and treasurer, J. H. Elliott, Rohm & Haas Co. of Canada, Ltd., Toronto.

The board of directors is made up of two members whose terms expire in 1956. A. W. Hutchison, Shell Oil Company of Canada, Lt., Toronto, and J. H. D. Ross, Canadian Industries, Ltd., Montreal; two members whose terms expire in 1957, P. E. Redman, National Grain Co., Ltd., Winnipeg, and S. R. Stovel, North American Cyanamid Ltd., Toronto. In addition, J. H. Elliott, treasurer, has two more years to serve as director while R. M. Ferguson, Dow Chemical Co. of Canada, Ltd., Winnipeg, has one more year to serve. M. F. Anderson, retiring president, will serve as a director ex-officio for one year.

In his address to the group, Mr. Anderson reported on continued growth of the association during the past year. Five new members have been added, bringing the total membership up to thirty-six.

Mr. Anderson referred particularly to the work of the association committees such as the publicity committee which has been particularly active and the technical section. The latter group has been considering a group of problems, some of which he listed as follows: Study of the Pea Root Rot Disease, Volatility and Hazards of Weed-Killing Preparations, Problems Arising from Increased Use of Pesticide-Fertilizer Mixtures, Standardization of Emulsifiable Concentrates, and Chemical Residue Tolerances.

Panel on Weed and Brush Control

OPENING the program at the afternoon session, October 13th, was a panel discussion, "Chemical Control of Weed and Brush in Canada." Dr. L. H. Shebeski of the University of Manitoba, Winnipeg, Manitoba, acted as chairman, referring a group of questions to the following panel members: J. W. Suggitt, The Hydro-Electro Power Commission of Ontario, Toronto; H. F. Stairs, New Brunswick Dept. of Agriculture, Fredericton, N.B.; H. W. Leggett, Canada Dept. of Agriculture, Regina, Sask., and J. J. Neilson, Western Ontario Agricultural School, Ridgetown, Ontario.

In general, the panel members look for a continued expansion in the use of herbicides and brush control materials in Canada over the next ten years. They predict a possible leveling out in the expansion curve in time as more effective control of susceptible species of weeds eventually cuts down the necessity for annual treatment, but none of the members voiced any belief that it will ever be possible to wipe out more than localized weed infestations. The goal should be weed control, they indicated, and not the impractical idea of elimination.

Mr. Leggett, commenting on the use of herbicides in the tremendous Western Canada market, predicted

The insecticide tolerance panel: (from L. to R.) F. M. Overholt, Plant Products Div., Dept. of Agriculture, Ottawa, M. G. Allmark, Dept. of Natl. Health & Welfare, Ottawa, Dr. E. P. Aikman, Chairman, Gen. Mgr., The Nichols Chemical Co. Ltd., Dr. T. W. Reed, California Spray - Chemical Corp., Haddonfield, N. J. and A. T. Sinclair, North American Cyanamid Ltd. Panel on Weed and Brush Control: (l. to r.) H. F. Stairs, H. W. Leggett, Dr. L. H. Shebeski, chairman, J. J. Neilson, and J. W. Suggitt.

a very bright future. Currently, he said, less than one-third of the total acreage seeded to cereal crops in this area is being sprayed. At least thirty million acres could profitably be sprayed each year, he believes. There as an impressive list of weeds resistant to 2,4-D which when chemicals are found to control them will at least double the potential. Wild oats alone, which infests at least 75% of the cultivated acreage of Western Canada, is the most pressing problem.

In this area, but 500,000 acres were sprayed in 1947. This total jumped to 4,000,000 acres in 1948, 8,200,000 in 1949, and for the past few years has averaged 12,000,000 acres annually.

In Manitoba and Saskatchewan, farmers took to use of herbicides rapidly—more rapidly than they did in Alberta and British Columbia. It should be possible within a few years' time, he predicted, to expand this market to 20,000,000 acres annually in Western Canada. Reaching this total, he indicated, is just a matter of breaking down prejudices against spraying and doing a good selling job.

Theoretically, he agreed, it is possible that the acreage treated might drop in ten years as control of susceptible species is achieved, but generally enough weeds are missed in a field, they germinate late or escape control through faulty spraying, and are thus present to reinfest the field.

Queried as to whether or not there has been any build-up in the area of weeds resistant to 2,4-D, he indicated that such a build-up is distinctly possible and may even have started in the area, although it has not as yet reached economic proportions. In almost any grain field, he noted, there are generally three or more species of weeds. If the main species is susceptible to 2,4-D, killing this species allows other and possibly resistant weed species to grow more vigorously until they may become the dominant weeds in the area.

Of the weeds resistant to 2,4-D in Western Canada, there are several that can be controlled by other chemicals, Mr. Leggett indicated. TCA controls green foxtail and quack grass. Dalapon and Maleic Hydrazide have been effective on quack grass. Maleic Hydrazide is also effective but not commercially practical on wild oats.

The greatest need at the moment, the speaker indicated, is for new herbicides that will control some of the weeds resistant to 2,4-D. Canada's number one weed menace is still wild oats. Some promise is currently seen in the use of IPC and CIPC as well as 2,4-D for the control of this weed pest.

Mr. Neilson, reporting on the situation in Ontario and Quebec, indicated that farmers in these provinces have been slower than those in the prairie provinces to take up the use of herbicides. Their margin between profit and loss on their crops is too low, he suggested, to make them willing to make changes and take chances until the new practices are clearly proved profitable. Only 3,450,000 acres were sprayed in Ontario in 1955, he reported, and a smaller acreage in Quebec.

Use of herbicides pays in this area, Mr. Neilson asserted, and he predicted an expanding market for years to come—particularly as more economical, efficient and selective herbicides are developed. No tendency has been noted in this area as yet for resistant species of weeds to become more prominent following use of herbicides such as 2,4-D.

J. E. Bussart, Velsicol Chemical Corp., John Stoddard, Prentiss Drug & Chemical Co., Al Weed, John Powell & Co. Div., Olin Mathieson Chem. Corp., Ray Byrne, Rohm & Haas Co. of Canada, Ltd., and Dr. T. W. Reed, California Spray-Chemical Corp.

The following chemicals have proved useful in controlling species of weeds resistant to 2,4-D.

Crabgrass—PMA and Potassium Cyanate

Foxtail—TCA

Wild Oats—Maleic Hydrazide

Golden Bedstraw—2,4,5-T and "Brushkill"

Milkweed—2,4,5-T and "Brushkill'

Twitchgrass—CMU, TCA and Chlorates

For special weed problems, the following have proved helpful:

Crag 1 — crabgrass and post-emergence on nursery stock, flowers and strawberries.

Dalapon—quack grass and annual grasses, cat-tails when combined with Kuron or 2,4,5-T.

Amino-Triazole — quack grass, poison ivy, cattails.

Kuron (Silvia)—horse nettle, poison ivy, cattails when combined with Dalapon.

Chlorea—general weed killer and soil sterilant.

Alanap—pre and post-emergence in cucurbits and pre-emergence in soybeans.

Premerge—pre-emergence in soybeans and cereals.

CMU—pre-emergence asparagus.

Natrin — post-emergence in tomatoes, some other vegetables and flowers.

Mr. Neilson said that he is looking forward to the day when there will be a herbicide as selective for each family of plants as is 2,4-D for the grass family—and within each family, growth regulators that will permit elimination of weeds in that family—yet do no harm to desirable members. What the industry needs, he concluded, is cheaper, more potent, more selective herbicides.

Reporting for the maritime provinces, Mr. Stairs indicated that the better farmers in New Brunswick have accepted 2,4-D readily, but not so in Nova Scotia. In the maritimes, he stated, use of 2,4-D has made growing of a large volume of seed grain possible and has made potato production more economical. He predicted a continued expansion in acreage sprayed in New Brunswick. In Nova Scotia, he believes that the better farmers will expand their use of 2,4-D and other herbicides, but that small farmers will not readily accept the practice. The sprayed acreage there is currently only about 10,000 acres and should be ten times this amount.

He reported that to date no build-up of resistance to 2,4-D has been noted in susceptible weeds. His general prediction for the area is for a gradual increase in the volume of herbicides used—no spectacular rise.

Mr. Suggitt dealt generally with the subject of brush control in Canada. Following initial use of 2,4-D for brush control in 1946, followed by the introduction of 2,4,5-T in 1947, there has been a tremendous expansion in the number of acres treated. As compared with 1500 acres of brush sprayed in Canada during 1950, almost 75,000 acres were treated in 1954. The cost of brush cutting is in the neighborhood of $70 per acre, while initial spraying costs range between $25 and $30 per acre and this figure drops to $15 to $20 for the second and subsequent re-spraying operations.

He observed that there are, of course, problems accompanying use of chemicals for brush control which include poisoning claims arising from the death of domestic animals grazing on freshly treated brush, claims of tainting streams, destroying small animal refuges, food sources, etc.

The principal unsolved problems in chemical brush control now

(*Continued on Page 97*)

Left photo: Members of the technical section: (from L. to R. around circle) J. H. Follwell, Shell Oil Corp. of Canada, W. B. Fox, Chipman Chemicals Ltd., A. W. Lougheed, Naugatuck Chemicals, L. M. Godfrey, Chipman Chemicals, Ltd., J. W. Busch, Niagara Brand Spray Co., F. S. Pearse, Dow Chem. Co. of Canada, Ltd., H. A. Pass, Greencross, Chairman, and in the center, A. T. Sinclair, North American Cyanamid Ltd. Right photo: Jack Damon, General Chemical Div., Allied Chem. & Dye Corp., G. F. Kerbey, Fairfield Chemical Div., Food Mach. & Chem. Co., Jack Polite, Diamond Alkali Co., Tom Snipes, Chemagro Corp., Sol Epstein, Emulsol Corp., and Dan Keating, Stauffer Chemical Co.

USDA Photo
Checking the effectiveness of commercial weed killers on a grass plot. The weeds remaining on treated and untreated plots are counted by means of a point quadrant.

WHAT GOVERNMENT RESEARCH MEANS TO THE PESTICIDE INDUSTRY

*By Samuel W. Simmons**

Public Health Service,
Communicable Disease Center
U. S. Department of Health,
Education, and Welfare
Atlanta, Ga.

ALTHOUGH almost everyone in the industry has some concept of the relation of government research to the pesticide industry, the mutual relation of research conducted by the government and research performed by the pesticide industry is not fully apparent until a close analysis is made.

One way that government research aids the pesticide industry is in creating new products for manufacture. An example is allethrin, a synthetic pyrethrin-like compound (allyl homologue of cinerin I) developed by the U. S. Department of Agriculture (Schechter et al., 1949, 1949-a). DDVP (dimethyl 2,2-dichlorovinyl phosphate), an organophosphorous compound, with a level of mammalian toxicity lower than that of parathion, is another new product, developed recently by the U. S. Public Health Service, and not yet available commercially (Mattson, Spillane, and Pearce, 1955). It is excellent for fly control, especially when used in a bait formula, and also shows considerable potential for use in agriculture (Kilpatrick and Schoof, 1955). Phenothiazine was synthesized in 1883, but was developed as a pesticide by the Department of Agriculture in 1934 (Smith, 1934). It has been found effective against a number of insects and is now used principally as a vermifuge for internal parasites of farm animals. In 1952, the domestic agricultural requirement of this chemical was 4,500,000 pounds (Roark, 1955). Rotenone-containing roots, derris and cube, were imported into this country in very small quantities prior to 1930. As a result of research by governmental and other agencies, the insecticidal qualities of rotenone were elucidated. Crude rotenone is now imported in large quantities (4 to 5 million pounds annually) (Roark, 1955) and the purified compound is a constituent of many very effective pesticides. As a result of work by the Entomology Research Branch of the Department of Agriculture, sesame oil was proved an effective synergist in pyrethrum-kerosene sprays and pyrethrum aerosols and promises to have considerable commercial value. There are many other examples of the effective collaboration between government and the pesticide industry in placing new and better pesticides in use. These results are more gratifying because the taxpayers' investment in this research has been amortized many times over.

Equally important as the production of new compounds is the development of new formulations and techniques for the use of materials with known pesticidal properties. Industry and government have contributed and shared mutually in this work, and industry now produces and distributes large quantities of materials on the basis of work accomplished in government laboratories. The work attending the use of DDT, an industrial development, is an example. Before DDT could be used effectively for control of vector-borne diseases and pests of livestock, many formulations were devised and tested before suitable methods were developed for its use. In the case of malaria control, for example, diluents were necessary

*Presented at the 22nd Annual Meeting of the National Agricultural Chemicals Association, Spring Lake, New Jersey—September 8, 1955.

which would insure maximum effectiveness of the DDT, were economical and easy to transport, and would not disfigure treated surfaces. As a result of research by the Public Health Service, the Department of Agriculture, and other agencies, concentrates of DDT emulsion have been prepared and sold in large quantities for many purposes by the pesticide industry. Emulsions proved ineffective, however, on porous material, such as adobe, since the mixture was absorbed beneath the surface. Both industry and government contributed to the development of wettable powder suspensions, which are now the predominating formulations used in many foreign countries.

Several new formulations not yet in the manufacturing stage, show promise for commercial distribution: (1) DDT-dilan emulsions have been made more effective against resistant houseflies by the addition of cottonseed or soybean oil (DDT: dilan: soybean oil; 200:200:80 mg./sq. ft.) (Kilpatrick and Schoof, 1954). This formulation has been prepared commercially and distributed for fly and roach control to the constituent plants of at least one large nationally operating corporation; (2) the addition of dimethyl carbonyl to DDT, at the rate of 1 to 5 or 10 parts, has been found effective as a space spray against DDT-resistant houseflies (Perry *et al.* 1953); (3) the addition of sugar markedly increases the residual effectiveness of the organophosphorus compounds, diazinon, malathion, and dipterex against houseflies (Kilpatrick and Schoof, 1955-a). These or other new formulations, particularly compounds used in agriculture, will soon be produced and distributed through commercial outlets.

In the search for new means for control of pests, government scientists are constantly finding new uses for existing commercial pesticides. Most of the commercial pesticides are tested by the government against all of the important public health and agricultural pests. When a material is proved effective, the demand and, consequently, the amount of material manufactured is increased. A few recent examples illustrate this point: (1) parathion and diazinon have been adapted to fly control in mess halls, dairies, and on rural premises by suspension of cords impregnated with these materials (Maier and Mathis, 1955; Kilpatrick and Schoof, 1955-b). The toxic hazard is minimum and flies are controlled effectively for 6 to 15 weeks; (2) dieldrin, endrin, and diazinon, principally agricultural chemicals, will protect animal carcasses from fly infestation up to 26 days (Baker and Schoof, 1955). You can visualize readily the importance of such an application in the event of a national catastrophe; (3) various chlorinated hydrocarbon compounds have been adapated for use in protection of premises from hordes of mosquitos by the residual treatment of surrounding vegetation (Bidlingmayer and Schoof, 1955).

Each year, many tons of both new materials and new formulations are manufactured as a direct consequence of government research. We in government are gratified to see such direct, practical results of our efforts.

Although not assuming liability for industry, the government protects the pesticide industry through research to establish criteria for safe use of pesticides. Obviously, every company wishes to distribute and recommend products that involve a minimum hazard to man and domestic animals. Additional security is gained if the compounds comply with safety standards established by the government on the basis of careful research work. In the absence of government standards, the manufacturers would have to do much more research and expensive policing. Uniform standards of safety would be difficult or impossible to establish, and probably neither the public nor the industry would have the protection now afforded. Regulatory restrictions resulting from government research do at times, however, work temporary hardships on industry. The sale and distribution of products is sometimes postponed or limited. The monetary loss in such cases, however, is probably less than that which would occur from premature distribution of unsafe materials.

Governmental and industrial research has established safe yet effective dosages for the use of most pesticides, residue tolerances have been established on many compounds, and recommendations have been made for safe use of most pesticidal materials. The results of these combined efforts permit utilization of the most effective materials with a minimum of risk on public health and agricultural programs.

While research results in regulation, it also prevents unnecessary restrictions. The government has an obligation, in both public health and agriculture, to recommend the most effective pesticides available that can be used with reasonable safety. If we are unreasonably cautious, we deprive the people of the benefits of technicologic advancements; if we are not cautious enough, we may foster a toxicolcgic hazard. In some instances, this double obligation exists in the same agency, for example, the U. S. Public Health Service. Our official and moral duty, therefore, is equally strong to not withhold effective commercial products from public use, as to prevent unnecessary exposure to products that are unduly hazardous. We are constantly criticized by fanatics of two extreme views. Some people believe that the use of any chemicals on our food, our animals, or ourselves is detrimental to health, and that use of all chemicals for these purposes should be banned by government regulations. Others propose that we should rely upon, and use only those older pesticides which have a long safety record. The latter ignores the fact that safety records of the older materials were established by usage, just as subsequent experience will attest the safety of many new compounds. Advocates of the opposite position implore that American industry be allowed to manufacture and sell effective pesticides with little government regulation, and that such evaluation as the government may make be confined chiefly to tests of compounds for their effectiveness as "bug" killers, without too much regard for hazard to human health. Obviously, neither attitude is held by research workers or administrators in government or in industry. The re-

sult of government research on toxicology of pesticides has done much to neutralize the efforts of those few who have used every fragment of information available to condemn modern pesticides. Although some of this negative philosophy has appeared in professional and technical journals, most public information has been obtained through newspapers or popular magazines. There are published statements suggesting that DDT or other new pesticides result in a variety of cardiovascular diseases, anemia, insanity, poliomyelitis, cancer, sinusitis, gastrointestinal malfunction, pneumonitis, alkalosis, and a host of other diseases with well-established etiology that have existed for centuries (Biskind, 1949, 1949-a, 1953; Biskind and Bieher, 1949; Merkin, 1954; Scott, 1954).

An epidemiologic study was made of 83 farm laborers, and a survey of 639 unselected persons on a large Mississippi plantation, where insecticides were used in large quantities persistently, and in some instances promiscuously, for the control of cotton insects (Fowler, 1953). Except for cases of poisoning due to overt carelessness, no effect of the chemicals on the subjects studied was noted. Comparisons were made of the incidence of disease before and after the introduction of modern pesticides, and of disease incidence in areas where insecticides were used intensively with areas where insecticides were little used. No evidence was found that pesticides were the cause of any chronic disease, or a contributing factor to diseases of other etiology.

The same conclusion was reached in the more intensive study reported by Sumerford *et al.* (1953) in connection with the use of organic phosphorus insecticides in the apple orchards of the Pacific Northwest.

The ideal for which we strive is, of course, a complete knowledge of the pharmacology of each compound. Such knowledge would make it possible to place the regulation of exposure, and many other practical matters on a rational basis. But knowledge of pharmacology must involve measurement of human exposure under practical conditions, the observation of human reaction to known dosages, and the testing of therapeutic measures on man. The study of laboratory animals is mere prologue to the study of man.

Our knowledge of every pesticide is incomplete. However, progress is being made. Studies have been reported on the exposure of public health workers to DDT (Hayes, 1955) and the exposure of orchard sprayers to parathion (Batchelor and Walker, 1954). Freeman and Epstein (1955), of the Army Chemical Center, have recently published a critical review of the medical treatment of 46 cases of human poisoning by parathion and TEPP. It is known, as the result of an experiment now being carried on by the Public Health Service with human volunteers, that dosages as high as 0.5 mg./kg./day may be taken daily for several months, without producing any adverse effect which the subject can detect, or which can be discovered by physical or laboratory examination (Hayes, 1955-a).

The fact that safe levels of exposure can be established does not indicate that modern pesticides are harmless. Proper precautions must be exercised in using the potent materials available. In spite of elaborate precautions, there are too many confirmed cases of poisoning and death from the use of pesticides. There would be more were not both industry and government constantly alert to the hazard. Actually, the safety record of the modern pesticides is good, comparing favorably with that of the older materials. We see no cause for alarm in the use of the new materials, as long as government and industry continue research to give adequate information on the characteristics of these compounds before they are released for sale. Perhaps even more important, is a continuing study of them under practical conditions, after they have been placed on the market. We do not believe that materials should be made available for sale until there is reasonable assurance that they can be used safely. Obviously, use of any material incurs some risk, especially in initial extensive use. Rarely is a material safe beyond any reasonable doubt. Only after years of use is enough experience acquired to provide adequate assurance that pesticides are completely safe when used, even according to recommendations. In most instances, however, more is known about the new chemicals that are placed on the market than was the case with older ones. This favorable circumstance is a result of industrial and governmental research motivated by a sincere desire of both industry and government to protect the public, and at the same time to provide as soon as possible the advantage of the latest discoveries in the field of pest control.

Much effort is devoted to toxicologic investigations of the newer pesticides, but when we consider the number and variety of compounds that have been developed in the past decade, I believe we will admit that luck has been on our side in preventing accidents. We can ill afford to delay an increase in investigations of the toxicology of economic poisons. New compounds are becoming available in greater numbers than ever before, and research facilities are not being developed proportionately. Suppose, and it could happen, that premature release of a pesticide resulted in illness or death to a large number of people. The restrictions that the public would demand could hamper operation of the industry for a quarter of a century. Although present regulations may seem arduous at times, the loss of the relative freedom of operations would be critical. The only way that this freedom from unnecessary regulatory restrictions can be assured is to continue adequate, unbiased research, both industrial and governmental, and on the basis of results, to develop recommendations that are practical and insure the public safety. The knowledge of the toxicity of a compound is not a practical guide to its usefulness. We have stated previously that "the toxicity of a substance is its capacity for causing injury, whereas the hazard of a substance is the possibility that such injury will actually occur." (Hayes and Simmons, 1950). Through the efforts of the pesticide industry and its associated organizations, together

(*Continued on Page* 105)

NITRIC PHOSPHATE PRODUCTION

Tah-Ho Huang
Taiwan Fertilizer Co.
Taiwan (Formosa), China

PHOSPHATE rock-nitric acidulation products containing two or all essential elements have been called nitro, nitra and nitric phosphates and compound fertilizers in the United States,* complex fertilizers in most OEEC countries,** and nitrophoska in pre-war Germany (12,17,34). These are the countries where the processes for solubilizing phosphate rock with nitric acid were first developed, or are being applied on a commercial scale.

With few exceptions, most phosphate rocks of commercial importance bear a $CaO:P_2O_5$ molal ratio of 3 to 4 (14, 24). The available phosphate compounds most well known to the fertilizer industry are mono- and dicalcium orthophosphates of which the $CaO:P_2O_5$ molal ratios are, respectively, 1 and 2. To convert the natural phosphate into such available forms, the surplus calcium oxide must be fixed or inactivated by acidulation, or other suitable means introducing thereby one or more acid radicles for the purpose.

Disregarding the intermediate and side reactions, it can be assumed, therefore, that the purpose of phosphate rock acidulation, with or without subsequent treatment, is primarily the formation of such compounds which bear a $CaO:P_2O_5$ molal ratio of 1 and 2.

Figure 1 is a simplified schematic illustration of the chemistry of nitric

*Ref. 1,2,12,13,15,16,18,20,21,27,28,30,32,33,34
**Ref: 3,4,5,7,8,9,10,11,19,22,23,24,29

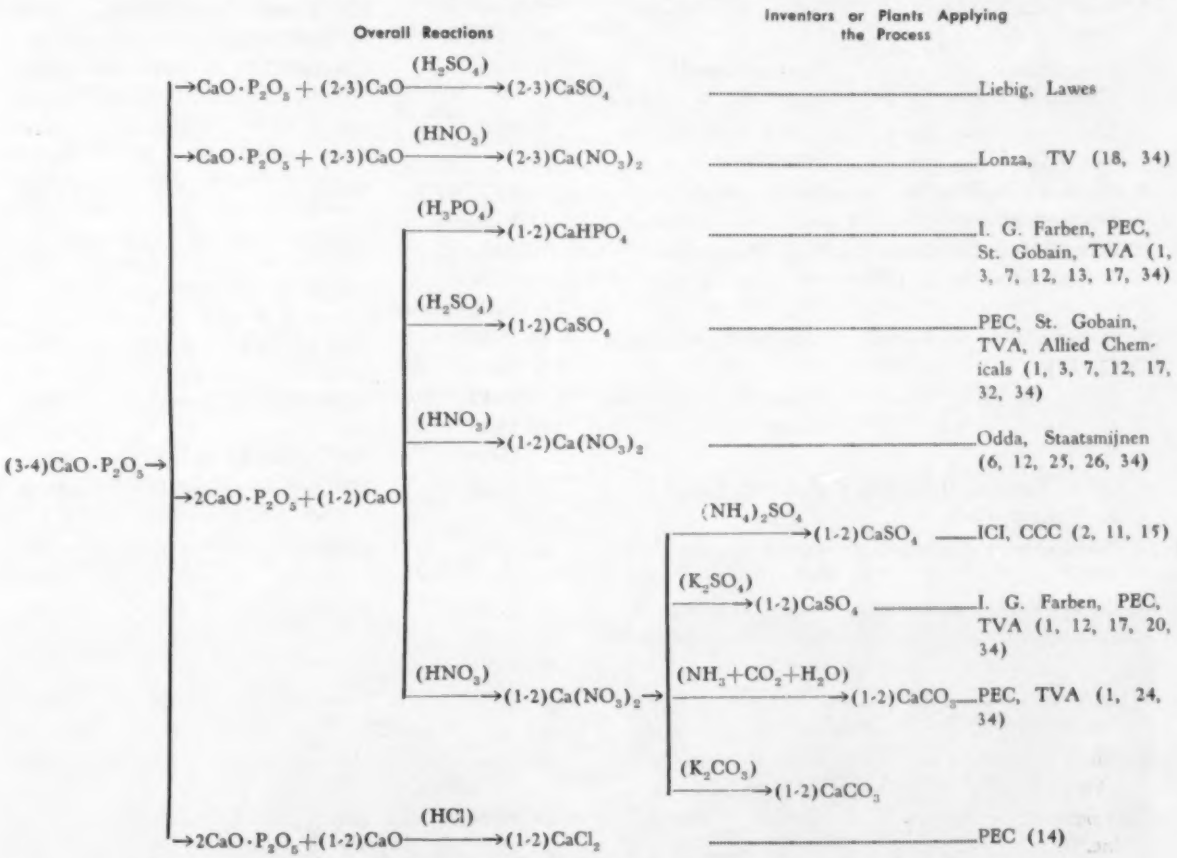

Overall Reactions
Inventors or Plants Applying the Process
(3-4)CaO·P2O5→
→CaO·P2O5 + (2-3)CaO —(H2SO4)→ (2-3)CaSO4 ..... Liebig, Lawes
→CaO·P2O5 + (2-3)CaO —(HNO3)→ (2-3)Ca(NO3)2 ..... Lonza, TV (18, 34)
→2CaO·P2O5+(1-2)CaO
—(H3PO4)→ (1-2)CaHPO4 ..... I. G. Farben, PEC, St. Gobain, TVA (1, 3, 7, 12, 13, 17, 34)
—(H2SO4)→ (1-2)CaSO4 ..... PEC, St. Gobain, TVA, Allied Chemicals (1, 3, 7, 12, 17, 32, 34)
—(HNO3)→ (1-2)Ca(NO3)2 ..... Odda, Staatsmijnen (6, 12, 25, 26, 34)
—(HNO3)→ (1-2)Ca(NO3)2→
(NH4)2SO4 → (1-2)CaSO4 ..... ICI, CCC (2, 11, 15)
(K2SO4) → (1-2)CaSO4 ..... I. G. Farben, PEC, TVA (1, 12, 17, 20, 34)
(NH3+CO2+H2O) → (1-2)CaCO3 ..... PEC, TVA (1, 24, 34)
(K2CO3) → (1-2)CaCO3
→2CaO·P2O5+(1-2)CaO —(HCl)→ (1-2)CaCl2 ..... PEC (14)

Figure 1. Inactivating Surplus Calcium Oxide in Phosphate Rock Acidulation

phosphate. Also shown therein are the superphosphate and the dicalcium phosphate processes. It gives an overall picture of the changes in $CaO:P_2O_5$ molal ratio and of the fate of the surplus calcium oxide.

As can be seen from Figure 1, only in the case of superphosphate is the $CaO:P_2O_5$ molal ratio reduced to 1. This greater change in ratio means higher consumption of acid, as must be provided for inactivating the surplus calcium oxide. To reduce the ratio to 2 or slightly lower would result in a substantial saving of acid. This is true with almost all the nitric phosphate processes, where the surplus calcium oxide is converted by suitable means into anhydrous or hydrated nitrate, or still better, into calcium sulfate, phosphate or carbonate. Carbonic acid is apparently the cheapest inorganic acid suitable for the purpose.

Among the factors to be considered in planning a nitric phosphate plant or operation, due thought should be given to the availability and cost of essential raw materials (especially nitric acid), costs of production of nitric phosphate by various patented or non-patented processes, and, most important of all, the adaptability of the new product or products (including calcium nitrate) to the local environment. In connection with the last point, the opinion of agronomists concerning plant food value, and the farmers' response to the new product or products under the local farming conditions must be consulted.

Table I is a brief survey of the nitric phosphate plants currently in

(*Continued on Page 109*)

TABLE I.

A Brief Survey of the Nitric Phosphate Industry of the United States and Europe

Company or Plant	Location	Essential Products	Essential Raw Materials	Approximate Daily Capacity (Metric Tons)	Production Started in
1. I. G. Farbenindustrie (17)	Piesteritz, E. Germany	14-14-18 12-12-21.5	H_3PO_4 (dry)-HNO_3	600-700	1934
2. Badische Anilin und Soda Fabrik (17, 34)	Oppau, W. Germany	14-14-18 12-12-21.5	H_3PO_4 (wet)-HNO_3	600-700	1934
3. I. G. Farbenindustrie (17)	Leuna, E. Germany	16-16-0 12-12-21.5	HNO_3 and K_2SO_4-HNO_3	220-240	1934
4. Gewerkschaft Victor Chemische Werke (1, 14)	Castrop-Rauxel, Westfalen, W. Germany	10-8-18	CO_2-HNO_3	640	1953
5. The Netherlands States Mines (6, 12)	Geleen, Limburg, the Netherlands	20-20-0	HNO_3	210	1948
6. Norsk Hydro-Electrisk Kvaelstoftiescelskab (6, 12)	Heroya, Norway	13.5-13.7-19.2 11.5-11.5-21	HNO_3	120	1938
7. Lonza Usines Electriques et Chemisques S. A. (24)	Basle, Switzerland	7.5-14-0 6.6-12-8 6-10-12	HNO_3		1933
8. Compagnie de St. Gobain (3, 24)	Chauny, Aisne, France	10-10-17	H_2SO_4-HNO_3	150	1947
9. Compagnie de St. Gobain (3, 24)	Rouen, Seine Inférieure, France	10-10-17 10-15-20 12-15-18	H_2SO_4-HNO_3 and H_3PO_4-HNO_3	360	1941
10. Office National Industriel de L'Azote (24)	Toulouse, France	12-12-20	HNO_3	130	1942
11. Etablissements Kuhlmann (24)	France	14-12-16	HNO_3	250	1940
12. Société Potasse et Engrais Chimiques (1, 14, 24)	Grand Couronne, Seine Inférieure, France	10-10-20 12-12-12 8-16-17	H_2SO_4-HNO_3	500	1942
13. Imperial Chemical Industries (2, 11)	Billingham, Durham, England	14-14-0	$(NH_4)_2SO_4$-HNO_3	380	1953
14. Allied Chemicals and Dye Corp. (2, 14)	South Point, Ohio, U. S. A.	12-12-12	H_2SO_4-HNO_3	180	1954
15. Asociated Co-Operatives, Inc. (2, 14)	Sheffield, Alabama, U. S. A.	14-14-14	H_3PO_4-HNO_3	180	1954

Carolinas Virginia Pesticide Formulators Association

HOLDS 2nd CONFERENCE

Newly elected officers of CVPFA (Seated): J. B. Maddrey, Planters Chemical Corp., 2nd v. p.; J. M. Maxwell, Maxwell Insecticide Co., 1st v. p.; W. P. Crown, Carolina Chemicals Co., president; and W. R. Peele, W. R. Peele Co., secretary-treasurer. 1956 Board of Directors (Standing): A. E. Leavitt, Apex Chemical Co.; R. W. Stephenson, Kirby Chemical Co.; and John Daly, Daly-Herring Co.

AN open discussion of problems and questions concerning the pesticide formulator highlighted the second annual meeting of the Carolinas-Virginia Pesticide Formulators Association held Oct. 3-5 at Holly Inn, Pinehurst, N.C. A 100 per cent registration of charter members together with more recent members voted to elect as the president for 1956 W. P. Crown, Carolina Chemicals Inc., W. Columbia, S.C. Other officers for the coming term are: 1st vice president, J. M. Maxwell, Maxwell Insecticide Co., Raleigh, N.C.; 2nd vice president, J. B. Maddrey, Planters Chemical Corp., Norfolk, Va.; and secretary-treasurer, W. R. Peele, W. R. Peele Co., Raleigh, N.C. Two new directors elected at the board meeting are A. E. Leavitt, Apex Chemical Co. and R. W. Stephenson, Kirby Chemical Co.

The part the formulator plays in pesticide composition was outlined to the CVPFA conference by guest speaker Dr. J. H. Cochran, Clemson College, Clemson, S.C.

Dr. Cochran suggested that the formulator consider the following basic questions in planning production and manufacturing operations of a product: (1) what is the pesticide to be used for? (2) how is the product to be applied? (3) how far in advance can the material be made before it must be used? (4) can the pesticide be registered? (5) are production facilities adequate? and (6) what additional safety precautions must be employed. In a further analysis of these points, Dr. Cochran noted that the basic manufacturer is the best source for data and background on the formulation of a particular compound. (*The complete text of Dr. Cochran's address appears on page* 41).

Dr. J. M. Grayson, Virginia Polytechnic Institute, Blacksburg, Va., also stressed careful consideration of legal requirements in pesticide formulation and suggested that some of the questions concerning pesticide residues may be clarified in the interpretation and enforcement of the recently passed Miller Law. As to some of the other factors of interest to the industry in general, Dr. Grayson reported that research is looking for better answers to "off-flavors," and improvements in operations which would re-

(1) W. Feustel, Vanderbilt Co.; J. Conner, Taylor Chemical Co.; and W. Gehweiller, Vanderbilt Co.
(2) J. Sharp, Prentiss Drug & Chem. Co.; J. Diem, Southern Agricultural Insecticides; Clyde Smith, North Carolina Agricultural Experiment Station; and John Stoddard, Prentiss Drug & Chem. Co.
(3) K. Holden, Chemagro Corp.; J. H. Cochran, Clemson College; and T. Riedeburg, Theodore Riedeburg Associates.

(1) P. S. Arey, Naugatuck Chemical Co.; K. W. Ballantine, W. R. Peele Co.; C. J. Nusbaum, N. C. State College; and R. W. Wert, Minerals and Chemical Corp.

(2) R. Rawls, Quality Chemical Co.; E. Phillips, Glendon Pyrophyllite; and W. C. Pickett, Statesville FCX.

(3) A. Fuchs, Diamond Alkali Co.; W. R. Peele, W. R. Peele Co.; and W. H. Burnside, Hercules Powder Co.

(4) W. H. Tiller, Southern Agricultural Chemical Co.; M. G. Newman, Maxwell Insecticide Co.; F. Reed, Farm Service Co.; and K. Krausche, Floridin Co.

(5) Some of the ladies attending the conference, (standing) Mrs. J. Cutler, Mrs. A. E. Leavitt, Mrs. J. M. Maxwell, Mrs. J. H. Diem, Mrs. N. E. Downing, and Mrs. F. S. Reid; (seated) Mrs. J. B. Maddrey, Mrs. G. Simches, and Mrs. Clyde Smith.

duce the hazards or potential hazards in handling insecticides.

Some of the pest control problems of specific interest to Virginia farmers, and of course to formulators, were outlined by Dr. Grayson. Among the most serious of these problems, he observed, are those concerning forage crop pests, particularly in view of the trend toward grassland farming in Virginia. Dr. Grayson cited statistics showing that in 1952 only 2 counties in Virginia reported damage by the alfalfa weevil . . . whereas by 1955, 68 counties showed damaging infestations.

Dr. Grayson noted a trend toward increased planting of pasture and forage crops in Piedmont and Tidewater, Va., and serious infestations by larvae of green June beetles. In addition to these pests, Dr. Grayson reported that damage is also being noted from the clover root curculio, clover root borer and aphids.

Dr. Grayson observed that damage by crop forage pests appears to be more of a problem this and last year, because grassland crops are relatively new to the area, and not entirely prepared for.

Although not new to the state, Dr. Grayson remarked that control of pests attacking peanuts and soybeans warrants more attention in Virginia. The fall armyworm, corn earworm and Mexican bean beetle attack soybean plants, while damage to peanuts has been attributed to leafhoppers and the southern corn earworm. Corn earworm damage was particularly severe in 1955.

Tobacco, a $90 million crop in Virginia, is threatened annually by flea beetles, aphids and horn worms, and must be protected with effective, safe, and non-damaging insecticides . . . lending plenty of opportunity to studies for new developments and greater production.

Still another potential market, observed Dr. Grayson, lies in insecticides for control of livestock pests . . . in view of the increasing number of livestock brought into the state of Virginia in recent years.

He concluded his talk with the comment that the Virginia Experi-

(Continued on Page 103)

THE PART THE FORMULATOR PLAYS IN MAKING A PESTICIDAL COMPOSITION

*By J. H. Cochran**

Clemson Agricultural College
Clemson, S. C.

*Presented before the Carolinas-Virginia Pesticide Formulators Association, October 3, Pinehurst, N. C.

IT has been stated that there is nothing that the formulator can do to make a non-effective pesticidal chemical more effective . . . He is not a magician. . . . But he can make a highly effective chemical relatively non-effective.

Unfortunately, many laymen and a few pesticide formulators think that a pesticide formulation can be made the same way that our grandfathers made their fertilizers. That is, pour the ingredients together and stir them up with a shovel or a hoe. I am sure all of you know that this job of pesticide formulating is not that simple.

Each chemical presents a different problem, and in many instances the formulator's task is greater than the chemist's. Therefore, let us look at some of the questions the formulator must consider.

First, and probably the factor that is most often overlooked—*What is the pesticide formulation to be used for?* e.g., Is it to be used against household pests, or pests attacking field crops? And in the case of the latter, does the pest to be controlled attack the plant above or below the surface of the ground? Is the pest a leaf feeder, or does it bore into some part of the plant? These are just a few, and I assure you that there are many more factors to be taken into consideration.

Second, *How is the pesticide to be applied?* e.g., As a spray, a dip, a dust, a granule, or is the pesticide to be applied with some other material such as fertilizer?

Third, *How far in advance of the time of application can the formulation be prepared?*

Fourth, *Can the pesticide be registered? Does it meet all of the federal and state regulations?*

Fifth, *Are plant facilities and equipment adequate for formulating this chemical?*

Sixth, *What additional safety measures are required to handle this product?*

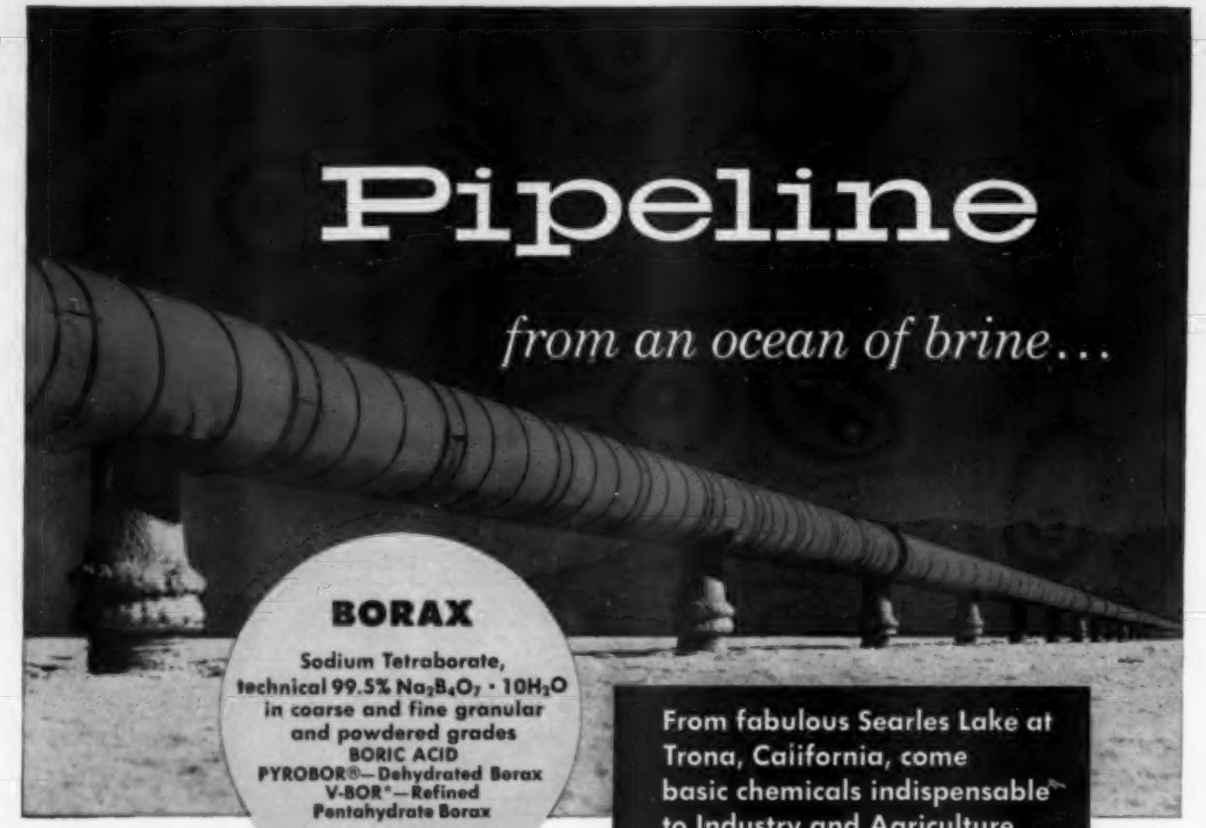
These are just a few of the items that must be considered. Before we go back and discuss each of the above listed factors, let us ask ourselves the question—Where can I, as a formulator, go to get the answers to these problems? I am not sure that there is any one place where you can find all of the answers. Many of them will have to be worked out by trial and error . . . but certainly the best source of information on formulating a specific compound is the basic manufacturer, or company from whom you buy your technical material. It is true that many of our larger basic manufacturers are not formulators, but almost all of them have a large research staff who are working on this problem. They are anxious to assist the formulator if, for no other reason than that they want to sell their materials, and they cannot do it if the formulator's product is not acceptable to the public. The other source for answers to your problems is your customer. The customer should not be overlooked, for apparently we are coming more and more toward the age of customer formulations. Another source of information is your state or federal experimental station. (As a member of a state experiment station staff, I must admit that state and federal research has not kept pace in the field of pesticide formulation with that of industry.)

Why is it necessary for the formulator to know for what purpose his product is going to be used? This is a basic question. A formulator would soon go broke trying to sell household insecticides in 50 and 100 pound packages. The household line is a small package business. On the other hand, he could not compete with his competitors if he tried to sell cotton insecticides in 5 and 10 pound packages. In the present market, the farmer wants his product packaged to suit his equipment. If he has a 400 gallon sprayer, he wants the insecticide packaged so that one unit or sack will make 400 gallons of spray.

Why should the formulator be concerned with how the farmer is going to apply his insecticide? If a majority of his potential customers have dusters, he would be foolish to prepare only emulsions, or vice versa. The method of application determines primarily the type of formulation. In the case of dust, if the material is to be applied primarily with ground equipment, one type of formulation is required; and if it is to be applied primarily by airplane, a different type of formulation should be used. Recently, three new types of pesticide formulations have become popular. They are: pesticide-fertilizer mixtures, granular compositions and dry baits.

Pesticide-fertilizer mixtures present the formulator with a difficult problem, for the farmer wants his product prepared to suit his own rates of fertilizer application. In fact, he wants the formulation prepared to suit his own rate of fertilization of a specific crop. To those of you who are saying to yourselves, "Thank goodness, I am not in the pesticide-fertilizer mixing business; I only supply the fertilizer mixer with the pesticide." I want to say to you that this problem does affect you. To make

(*Continued on Page* 108)



BORAX

Sodium Tetraborate, technical 99.5% $Na_2B_4O_7 \cdot 10H_2O$ in coarse and fine granular and powdered grades
BORIC ACID
PYROBOR®—Dehydrated Borax
V-BOR*—Refined Pentahydrate Borax

From fabulous Searles Lake at Trona, California, come basic chemicals indispensable to Industry and Agriculture.

POTASH

Agricultural Muriate 95-98% KCl, Chemical Muriate 99.5% KCl, and Sulphate 95-98% K_2SO_4

American Potash & Chemical Corporation

TRONA INDUSTRIAL AND AGRICULTURAL CHEMICALS

Offices:	3030 West Sixth Street, Los Angeles 54, California 99 Park Avenue, New York 16, New York 214 Walton Building, Atlanta 3, Georgia
Export Division	99 Park Avenue, New York 16, New York
Plants	Trona and Los Angeles, California; San Antonio, Texas

LITHIUM

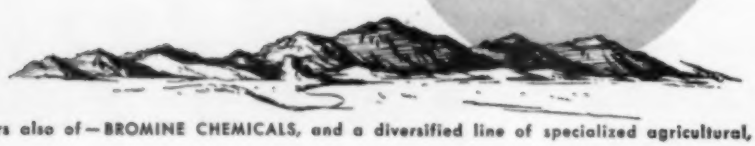
Lithium Carbonate, Lithium Chemicals, Lithium Ores

SODA ASH

Sodium Carbonate, technical 99.2% Na_2CO_3 58% Na_2O in granular and fine granular grades

SALT CAKE

Sodium Sulphate Anhydrous, 97.0% Na_2SO_4 minimum, in regular and industrial grades



*Trade Mark AP&CC

Producers also of—BROMINE CHEMICALS, and a diversified line of specialized agricultural, refrigerant and industrial chemicals

FERTILIZER
Views and News

By Vincent Sauchelli

YOU may expect to see in this column news and views about fertilizers and our industry with which you may or may not always agree. Honest differences of opinion must always be expected and will be welcome. My purpose shall be to present news and views without bias, but I shall not hesitate to express my personal views where I have a strong conviction that such are in the best interests of our industry.

Rate of Solubility of Fertilizers

DURING a recent visit in the Southwest, I learned that some salesmen promoting certain pelletized fertilizer materials were emphasizing the quick solubility of their product as an outstanding reason why the farmer should prefer them. In the promotion of their product, they place some of the material in water, stir it and presto! it is gone. You see, they say, "how soluble our product is; the competitor's product is not as quickly soluble" . . . and they proceed to show this by some water-solubility test. True enough, the other product does not seem to dissolve as rapidly. The impression they want to create and leave in the mind is that the demonstrated quick solubility carries over into the soil, and the crop plant is fed so much faster. Really now, how much truth is there to such claims?

The alleged superiority of a quickly soluble material over a more slowly soluble product is of little practical value to profitable crop production. The crop plant, like all living organisms, requires nourishment throughout its growth cycle and not merely at the beginning. Generally speaking, complete commercial fertilizers are composed of the same raw materials: ammoniates or nitrates or both provide nitrogen; phosphoric acid comes either from normal or concentrated superphosphates; and potassium generally is derived from muriate, that is, potassium chloride. The phosphates comprise monocalcium phosphate and dicalcium phosphate and a very small amount of tricalcium phosphate: of these only the monocalcium is water soluble; the dicalcium being soluble in dilute acid is considered available to the growing crop. The potash salt is water soluble.

It is necessary to realize what takes place in the soil when the fertilizer is mixed with it. The phosphoric acid is very active and has a strong tendency to combine with iron, aluminum and calcium present in the soil. Now, *regardless of the source,* when the phosphate ion is in a water solution, it diffuses throughout the soil mass and follows its natural bent to combine with the previously mentioned chemicals. Whether the phosphate ion, (that is, that portion of the phosphatic compound which splits off when it goes into water solution), is derived from a completely and rapidly soluble material, or from a more slowly soluble compound, will make little difference insofar as feeding the crop is concerned. The time interval between the two types may not be more than a few hours, as is shown in Table 1.

(*Continued on Page* 107)

TABLE 1.

Rate of dissolution of granulated superphosphate in several soils held at varying soil moisture contents.

Time of soil-fertilizer contact	Hillsdale sandy loam		Brookston loam		Time of soil-fertilizer contact	Hillsdale sandy loam		Brookston loam	
	Soil Moisture	P remaining in granule*	Soil Moisture	P remaining in granule*		Soil Moisture	P remaining in granule*	Soil Moisture	P remaining in granule*
Hours	%	%	%	%	Hours	%	%	%	%
3	3.2	70.0	2.8	83.3	3	7.5	47.6	6.5	64.5
6	3.2	57.0	2.8	81.3	6	7.5	38.0	6.5	48.2
12	3.2	36.9	2.8	82.3	12	7.5	25.0	6.5	47.5
24	3.2	33.6	2.8	79.4	24	7.5	27.0	6.5	43.3
3	5.4	62.5	4.5	76.8	3	10.8	45.0	7.8	48.8
6	5.4	40.0	4.5	76.8	6	10.8	34.0	7.8	39.0
12	5.4	25.9	4.5	73.5	12	10.8	30.6	7.8	31.9
24	5.4	28.1	4.5	69.8	24	10.8	16.2	7.8	31.9

*Results based on total chemical analyses for phosphorus and verified by activity measurements.

Photo courtesy Crolius, National Plant Food Institute

Fertilizer control officials pictured at banquet given them by National Plant Food Institute. New president of the organization is M. P. Etheredge, Mississippi, left. Others in front row (l. to r.) are R. W. Ludwick, New Mexico, past president; Stacy B. Randle, New Jersey; and J. J. Taylor, Florida. Rear row (l. to r.) Bruce D. Cloaninger, South Carolina, secretary-treasurer; J. D. Patterson, Oregon; C. V. Marshall, Canada; and F. W. Quackenbush, Indiana. Dinner was held in Shoreham Hotel.

Industry Attendance High at Control Meetings

IN contrast with other meetings in recent years, the conventions of fertilizer and pesticide control officials in Washington, D. C., last month were relatively quiet. There were many vigorous discussions on problems facing the state officials, particularly in the off-the-record portions of both meetings, but there was little of the excitement of former years, when high analysis fertilizers, fertilizer-pesticide mixtures, soil conditioners and foliar feeding were lively topics.

Both conventions were held in the Shoreham Hotel, following the annual meeting of the Association of Official Agricultural Chemists, the parent group. The Association of Fertilizer Control Officials met Oct. 14, and the Association of American Pesticide Control Officials a day later. Membership is largely identical.

Everyday problems of the control officials, in making sure that shipments of plant foods and pesticides contain exactly what the label claims, were aired in the States Relations committees of each group, the evening before the regular convention session.

Research and Safety

AT the formal meetings, the fertilizer officials heard talks primarily concerned with new developments, equipment and products in use in fertilizer plants. The pesticide group focused its attention on safety considerations in using pesticides.

Elections were on the normal move-up basis, M. P. Etheredge, of Mississippi, elected to head the fertilizer association and Clyde A. Bower, Oklahoma, chosen to head the pesticide group for the coming year.

Industry attendance at the meetings was particularly high this year, with 80 men at the fertilizer convention and a slightly smaller number attending the pesticide control meetings. The industrymen were primarily interested in the comments of the control officials at the informal meetings. On the first evening, the States Relations committee of the AAFCO held a round table discussion instead of the usual general open discussion.

The following participated in the panel, moderated by H. J. Fisher, Connecticut rep.: Bruce D. Cloaninger, Clemson Agricultural College; H. Walls, Maryland rep.; M. D. Sanders, Swift & Co., Chicago; Bruce Poundstone, Kentucky rep.; S. F. Thornton, F. S. Royster Guano Co.; W. J. Tucker, GLF, Ithaca; J. L. Clouth, Delaware rep.; and E. Kapusta, U. S. Potash Co.

The following list of questions were discussed by the panel, and by the audience:

1. If the nitrogen in a liquid fertilizer is derived solely from urea, should a guaranty of "Total Organic Nitrogen" be: (a) permitted; or (b) required?
2. Should all States adhere to the letter of Regulation T-R-1 and consequently forbid the use of a fourth numeral in the grade to cover magnesium?
3. What is the most acceptable group name for the urea-formaldehyde polymers that have recently appeared on the market as sources of available not-readily-soluble nitrogen?

4. Should over-run in one component be balanced against under-run in another component in deciding whether a sample is deficient?
5. Should not tolerances be on a percentage rather than an absolute basis, so as not to penalize high-analysis fertilizers where problems of controlling analyses, sampling, segregation, etc., are actually greater?
6. Has the use of different analytical methods by industry and control chemists been an actual problem, particularly as regards analyses for insecticide ingredients?
7. Why does the same manufacturer charge different prices to dealers on opposite sides of a State line?
8. How should the application of diluted fertilizer solutions to lawns by oil companies be handled, from the points of view of labelling, registration, reporting of tonnages used and payment of taxes thereon?
9. Should the present guaranties for P_2O_5 and K_2O be changed to an elemental basis, and if so, when and in what manner should the change be brought about?

The emphasis on research at the formal sessions which followed the next day was keynoted in the presidential address delivered by R. W. Ludwick, New Mexico, who said that in many cases "results of research work are not reaching the farmers and other consumers who could benefit from it." He gave credit to the industry, extension service and experiment stations for disseminating information, but cautioned that much more of this work needs to be done.

Praises Associations

HE praised the work of the plant food educational societies, such as the Oklahoma Plant Food Association, in staging test plot demonstrations to show the value of fertilizers. He added that dealers whose main business is operating a garage or other unrelated business are not fitted for the job of showing the efficient use of plant foods.

Mr. Ludwick called for uniformity in sampling techniques, and in the manufacture of fertilizers. He commented that fertilizer-pesticide mixtures are here to stay and probably will increase (an attitude supported in comments by many other officials). He concluded his talk with a plea for immediate action on the part of the association to change permanently the guarantees for P and K to the elemental basis which is being pushed by agronomy groups. This plea was rejected a few minutes later, however, when the association approved a committee recommendation continuing the elemental guarantee on a temporary status (as it has been for several years) until 1958.

Talks on fertilizer research were given by Dr. J. B. Pitner, manager of Agricultural Services, Grace Chemical Co., Memphis; Dr. J. Fielding Reed, Southern manager, American Potash Institute, Inc., and Dr. E. C. Kapusta, Technical service director for U. S. Potash, and a former staff member of the National Fertilizer Association.

Fertilizer, pesticide officials discuss their problems at conventions in Washington Oct. 14-15.

Agricultural Research

DR. PITNER cited research in anhydrous ammonia, broadcasting of fertilizers and tracing plant foods with radioactive materials. He said further research is needed on fall application, supplemental irrigation, and use of cover crops. Dr. Reed listed some of the things that can and cannot be foretold by using soil testing. He said that, while soil tests can give a good idea of the fertilizer need on a given plot, the general fertility level of the soil also must be considered. "Furthermore," he advised, "we must educate the farmer to think in terms of plant nutrients and to make his own selection of fertilizer on the basis of all available information."

Dr. Kapusta outlined the expansion in the fertilizer industry, particularly in nitrogen and potash and some of the processes which have made this expansion possible. He said two new companies are planning to mine potash at Carlsbad. Dr. Kapusta also noted increased use of anhydrous ammonia, fertilizer-pesticide mixtures, granulated materials, and liquid mixed fertilizers.

"Chemical technology has replaced the rule-of-thumb in formulating fertilizer mixes," Dr. Kapusta declared. He said that this technology had enabled higher analysis mixes, which in turn have decreased freight costs to formulators and disttributors.

There are more than 100 mixing plants in the United States that have or soon will have granulation equipment. "The Midwest is the biggest area for granulation so far, but plants in other sections of the country are turning to the technique."

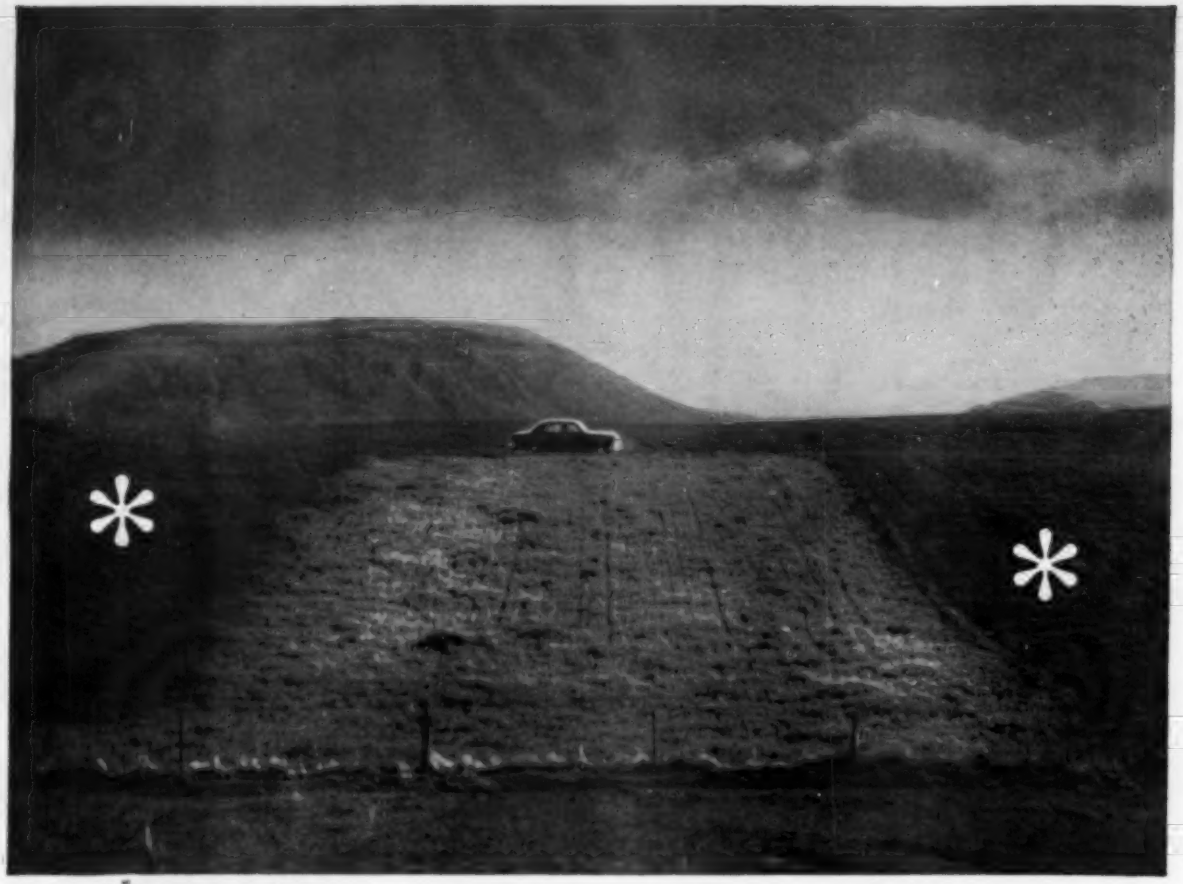
Considering fertilizer-pesticide mixtures, the speaker quoted figures that showed 200,000 tons of F-P mixes were used in 1954-55, as compared with only 90,000 tons in 1952-53. He added that the increased demand for the mixtures had brought many new problems to the fertilizer mixer because he has the biggest job in formulating them.

On the latter subject, another speaker said "the rush by manufacturers to make complete liquid fertilizers is greater than the rush by the farmer to use them." The speaker was R. B. Ellsworth, a consulting chemist from Indianapolis, who said that the Midwest leads in liquid fertilizer consumption. Mr. Ellsworth described the steps by which a manufacturer gets into the liquid fertilizer business and how he usually markets the material.

"You need $100,000 to start," he declared," and the business usually is operated on a current basis with the customer; otherwise additional capital would be required." He broke down the figure to show that approximately $35,000 is needed for the plant and about twice that amount for operating capital.

"The second requirement is low-cost formulations. "Our flow sheets

(*Continued on Page 96*)



*Moly MAKES NITROGEN WORK

Alfalfa, clover, and other legumes need traces of molybdenum in order to fix nitrogen. When "moly" is lacking in the soil, legumes cannot make use of atmospheric nitrogen . . . crops are stunted and pale . . . stands are hard to establish, often dying out quickly.

Treatment of deficient soils with a few ounces of a moly chemical per acre has increased yields up to six times.

Try it for yourself—make a molybdenum trial on poor pasture and legume stands. Moly can be applied by mixing with fertilizers, as a spray, or as a seed treatment. Write for our bulletin "Testing for Molybdenum Deficiency." *Dept. 43, Climax Molybdenum Co., 500 Fifth Ave., N. Y. 36, N. Y.*

learn why, first hand:

A little moly in each ton of fertilizer is BIG crop insurance.

This advertisement is printed in one shade of molybdenum orange, a pigment widely used for its striking color and good coverage — ideal in paint for farm and field equipment.

Here's how the test was made:

1. Location: Property of M. L. Roberts, Waitaki County, New Zealand.
2. History: Alfalfa sown in 1948-1949 season. Limestone applied at rate of 1 ton per acre at time of sowing. Superphosphate applied twice before test without noticeable effect.
3. Soil type: Kauru silt loam, a poor slowly weathering soil of sandstone origin.
4. Soil conditions: pH 5.9. Exchangeable calcium high, potash very high, phosphate adequate, limestone required in maintenance quantities only. Available molybdenum (Griggs method) 0.09 ppm.
5. Test conditions: Sodium molybdate in water solution sprayed on side areas in December, 1951, at rate of 2½ ounces an acre. Side areas resprayed at same rate August, 1953.
6. Results. Above photograph taken October 30, 1953 shows increase in yield estimated at 500%. Pale center area was not sprayed.

MA 43

CLIMAX MOLYBDENUM

LISTENING *Post*

Row Fumigation for Control of Root Knot Nematodes

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Epidemics and Identification Section, Horticultural Crops Research Branch, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

ROBERT Aycock of the South Carolina Agricultural Experiment Station writes that root knot nematodes, *Meloidogyne incognita* var. *acrita*, are frequently a limiting factor in cantaloupe production on the lighter soils in South Carolina. The uncertainty of market conditions and the low per-acre returns often realized from this crop make application of soil fumigants to whole fields impractical from an economic standpoint. Since data on row fumigation are lacking for this crop, experiments were performed in 1954 in which the application of a single stream of fumigant per row was compared with 2 streams spaced 12 inches apart.

Plots were laid out in two locations on Norfolk sand which previously had been planted to cotton for several years. One location was considered average for cantaloupe production in South Carolina, while the other was inferior and of lower fertility. Ethylene dibromide (Dowfume W-40 and Dowfume W-85), dichloropropene - dichloropropane (D-D), and 1-3 dichloro, 2 bromopropane (Nemagon) were the fumigants used. (Dowfume W-40 and Dowfume W-85 are manufactured by the Dow Chemical Co., Midland, Mich.; D-D and Nemagon by the Shell Chemical Co., New York.) The soil had been disked during the winter. Ten days prior to fumigation, it was turned with moldboard plows, then disked again and smoothed with a drag-tooth harrow.

Rows were laid off at 6-foot intervals and fertilizer (3-9-9) was applied at the rate of 800 pounds per acre in the furrow. Each treatment was replicated 4 times, using 4-row plots, 50 feet in length. Each plot was further subdivided into subplots of 2 rows each. Plot arrangement conformed to that of the split-plot design.

Fumigants were applied with gravity flow apparatus in subplots, either as a single stream in the center of the row or as two streams spaced 12 inches apart, each plot being split for the two methods of fumigation. Prior to application, the original furrows were reopened with a shovel plow. Where the double stream of nematocide was used, it was necessary to open 2 furrows per row, in order that the material would be placed 6 to 8 inches below ground level. Control plots were set up in the same manner, except that no fumigants were applied. All furrows were ridged upon immediately after application so that the materials were about 10 inches below the top of the bed.

Rates of application of each material per linear foot were as follows: DD and Dowfume W-40, 3.6 cc; Dowfume W-85 and Nemagon, 1-2 cc. Soil moisture at time of application was about field capacity and soil temperature was 58°F. Minimum air temperatures were above 50°F. on 8 of the days during the period between fumigation and planting.

Seed of Hales Best, Jumbo strain, were planted 3 weeks after fumigation in hills 3 feet apart. Plants were thinned to one per hill before they began to produce vines.

Since the two sets of data obtained were similar except for certain minor variations, only one experiment will be discussed in detail.

Plant Growth: Stands were unaffected by fumigation with DD and Dowfume W-85 (Table One). The number of plants emerging was significantly reduced in both experiments where 2 streams of Dowfume W-40 were used, but was unaffected where only 1 stream was applied. Extreme injury occurred in plots treated with Nemagon. Not only was emergence drastically reduced, but many seedlings failed to survive. Injury was significantly greater where 2 streams of fumigant were applied.

Striking differences in plant vigor were noted. Plants in all fumigated plots, except those treated with Nemagon, grew off much more rapidly than did those in control plots. In control subplots, where 2 furrows were reopened after fertilizer application, plants were much more reduced in size than where only 1 furrow was reopened. A tendency toward this condition was observed also in certain fumigated plots in one experiment, but was much less pronounced.

Yields: Yields of marketable fruit are shown in Table Two. Mean yields for plots treated with Dowfume W-85, Dowfume W-40, and DD more than doubled those harvested from the control plots. Subplots that received only 1 stream of these materials appeared to outyield those that received 2 streams, but this difference was not significant except in the case of DD. The extremely low yields in Nemagon treatments were caused by phytotoxicity which affected the seedlings. Where the single stream of fumigant was applied, Dowfume W-85, Dowfume W-40 and DD plots outyielded the appropriate control by approximately 60 per cent. Control subplots

in which 2 furrows were reopened after fertilizer application yielded only about half that of subplots in which only 1 furrow was reopened.

Root Knot Indices: After harvest was completed, roots of 10 plants from each subplot were examined for severity of root knot. Results are shown in Table 3. The application of 2 streams of Dowfume W-85 and DD resulted in significantly lower mean root knot indices than did those where only 1 stream was applied. Dowfume W-40 gave significantly better control than did Dowfume W-85 and DD, regardless of how applied. Best control was obtained in plots treated with Nemagon.

Conclusions: These results show that Dowfume W-85, Dowfume W-40, or DD applied as a single stream in the row is effective in recovering yields lost by heavy root knot infestations. Applying 2 streams per row at the same rate per linear foot further reduced the amount of galling, but resulted in no increase in yield over the 1-stream method of application. Since root knot was equally severe in both control subplots, the lower yields obtained where 2 furrows were reopened indicates that some factor other than nematode infestation was involved. This tendency was partially overcome in fumigated plots. Hence, it appears that the opening of 2 furrows might have resulted in an unfavorable placement of the fertilizer, and that plants treated in plots might have had an advantage over control plants in obtaining nutrient elements because of their healthier root systems. Where partial control was obtained, root systems were more extensive, and plants were not so affected by fertilizer placement.

Reduction in the amount of galling where a double stream of fumigant was applied indicates that a larger zone of protection was afforded, and probably also that many infestations were delayed.

The application of Dowfume W-85, Dowfume W-40, and DD applied as a single stream in the furrow, followed by immediate ridging significantly reduced galling caused by Meloidogyne *incognita* var. *acrita*, and significantly increased yields of marketable cantaloupe fruit. Two streams of these fumigants applied in furrows 12 inches apart significantly reduced galling but resulted in no increase in yield over that obtained where the 1 stream method of application was employed.

TABLE 1.

The Influence of Row Treatments with Soil Fumigants on Stand of Cantaloupe Plants

Fumigant	Mean stand[a]		
	One-furrow Application	Two-furrow Application	Mean
Dowfume W-85	167	161	164
Dowfume W-40	165	147	156
DD	154	156	155
Nemagon	75	27	51
Control	160	168	164
Mean	144	131	——
LSD (.05)	14	14	14
LSD (.01)	20	20	20

For method of application means: LSD (.05) = 9; LSD (.01) = 13. For method of application means of the same fumigant: LSD (.05) = 20; LSD (.01) = 28.
[a]Stand count made 10 days after planting and based on 204 seed planted.

TABLE 2.

The Influence of Row Treatments with Soil Fumigants on Yield of Marketable Cantaloupe Fruit

Fumigant	Yield in number of marketable fruit		
	One-furrow Application	Two-furrow Application	Mean
Dowfume W-85	84.7	73.7	79.2
Dowfume W-40	82.5	82.2	82.2
DD	86.7	73.0	79.9
Nemagon	55.0	16.7	35.9
Control	51.7	27.2	39.5
Mean	72.2	54.6	——
LSD (.05)	18.8	18.8	12.3
LSD (.01)	26.3	26.3	17.3

For differences between means for methods of application: LSD (.05) = 6.2; LSD (.01) = 8.5. For differences between methods of application for each fumigant: LSD (.05) = 13.7; LSD (.01) = 19.0.
Conversion factor for obtaining per acre yields: 72.6.

TABLE 3.

The Influence of Row Treatment with Soil Fumigants on Severity of Root Knot

Fumigant	Root knot indices[a] after harvest		
	One-furrow Application	Two-furrow Application	Mean
Dowfume W-85	53.9	37.1	45.5
Dowfume W-40	29.6	17.0	23.3
DD	62.7	42.5	52.6
Nemagon	18.5	19.5	18.9
Control	81.5	81.2	81.4
Mean	49.2	39.5	——
LSD (.05)	14.3	14.3	14.0
LSD (.01)	20.0	20.0	19.7

For differences between method of application means: LSD (.05) = 6.5; LSD (.01) = 8.9. For differences between method of application means for each fumigant: LSD (.05) = 14.5; LSD (.01) = 20.1.

[a]Indices were obtained by giving a numerical rating to 10 plants per plot according to the following scale: 0 = clean roots; 1 = trace infection; 2 = slight; 3 = moderate galling; 4 = severe, whole root system galled, but in sound condition; 5 = severe, whole system galled with root decay and disintegration. Class values assigned to each rating were as follows: 0 = 0; 1 = 10; 2 = 25; 3 = 50; 4 = 75; 5 = 100.

Cereal and Forage Pests, Cabbage Looper, Black Fly . . . Active

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head—Economic Insect Survey Section, Plant Pest Control Branch, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the U. S.

By Kelvin Dorward

AMONG the more important cereal and forage insect developments of late September and early October was the reporting of southwestern corn borer in Louisiana and alfalfa weevil in New York for the first time. Southwestern corn borer, which occurs in areas of states between Arizona and Missouri, has been found in five Louisiana parishes (Sabine, DeSoto, Webster, Bossier and Caddo) with one infestation in corn amounting to 40 percent. The alfalfa weevil record in New York was established when larvae were collected at Westtown in Orange County, June 27, 1955. This important pest of alfalfa has now been found in eight eastern states.

There were several other reports of interest during this period. Results of the spittlebug survey in Illinois indicate heavy infestations may be expected in legumes in the northern counties in 1956 with moderate to non-economic populations predicted for the remainder of the counties surveyed. Corn earworm damage to grain crops continued, with general infestation in grain sorghum in Tennessee, heavy infestations on corn in Michigan and New Jersey, and severe damage to this crop in southern Nevada. Fall armyworm was also of concern in areas of Texas, Louisiana and Alabama. In early October, insecticidal treatment was required in many fields of young oats in Louisiana. At this time also, this armyworm was light to heavy on small grains and legumes in several Texas counties. Garden webworm was light to heavy in alfalfa and small grains in Denton and Wise Counties, Texas, with some alfalfa fields being completely destroyed. Yellow clover aphid damage to alfalfa continued in several areas with considerable damage to new seedings in Graham County, Arizona. Increasing populations were reported in Box Elder and Weber Counties, Utah and in Brazos and Burleson Counties, Texas. Moderate to heavy populations continued in North Platte Valley of Nebraska.

Velvetbean caterpillar was causing damage on soybeans in areas of Florida, South Carolina and Alabama and defoliating alfalfa in Red River and Natchitoches Parishes, Louisiana. Peanuts were also damaged by this insect in the latter state, and Texas reported trouble on this crop in several counties from the lesser cornstalk borer. Looking ahead to small grain insect conditions later this fall and winter, Kansas reported that the brown wheat mite was appearing on volunteer wheat in the southwestern area, and false wireworms were widespread, and in destructive numbers in some fields in the Rush County area. Brown wheat mite has also been noted on fall-seeded wheat in Kingfisher County, Oklahoma.

Cabbage Looper Damage Continues

DURING late September and early October, the cabbage looper continued as one of the major vegetable pests of the season. Damage to lettuce was reported from Clark County, Nevada, and in untreated fields in Maricopa County, Arizona. Infestations required control on cole crops in many sections of Louisiana, with up to eight larvae per leaf of broccoli. Unprotected fall collards received considerable injury in the Charleston, S. C. area. The looper was held largely responsible for injury to young kale and other similar crops in southeastern Virginia . . . was extremely troublesome on cabbage in some areas of Michigan, and caused serious losses in cabbage-growing areas of southern Wisconsin. Severe infestations occurred on crucifers in New Jersey early in September.

Corn earworm damage to vegetable crops continued also. New Jersey and Virginia reported damage to beans. Insecticides were required in Pueblo, Otero, and Bent Counties, Colorado, to prevent heavy damage to tomato fruits, and infestations were recorded in peppers in Tennessee. Other truck crop insect activity of interest included heavy wireworm infestation on potatoes in southern Wisconsin, pickleworm damage to cucurbits in eastern areas of South Carolina and Virginia, heavy numbers of Mexican bean beetles on young snap beans in eastern Virginia, and unusually heavy infestation of sweetpotato weevil in Falls County, Texas.

Citrus Blackflies in Rio Grande

THE citrus blackfly, which was not known in the continental United States prior to its discovery May 31, 1955, at Brownsville, Texas, has been found at two additional locations in the Rio Grande Valley in this state. Two light infestations were found at Progresso in southeastern Hidalgo County on August 8 and 9. One of these was in a small commercial orchard. On September 20 and 26 two light infestations were found on dooryard citrus in the city of Laredo. These infestations were about 25 blocks north of the International Bridge. Control measures were taken in all cases.

Insects Active on Nut Crops

THE walnut caterpillar was reported from several states during late September. The insect was defoliating walnuts throughout Indiana, and was medium to severe on walnut trees in north central Virginia, with some trees completely defoliated. Defoliation or general infestations on pecans were recorded in the Hampton area of Virginia as well as in southern Alabama, Choctaw and Oktibbeha Counties, Mississippi and Okaloosa and Alachua Counties, Florida. The pest was also more abundant than

(*Continued on Page 97*)

Summary of Tolerance Applications Filed Up to October 1, 1955 for Pesticides

In a later issue we will publish a complete list of Tolerances granted

Chemical	Fed. Reg. Date	Date Acknowledged	Company Requesting Tolerance	Tolerance
Aldrin	4/15/55	4/11/55	Shell Chemical Corp., New York	1 part

Commodities:

Apples, pears & quinces, avocados & papayas, berries of the bramble type, blueberries, citrus fruits (including grapefruit, lemons, oranges, tangerines) cranberries, currants, dates, figs, gooseberries, grapes, guavas, peaches, nectarines, apricots & mangoes, pineapples, plums & prunes, strawberries, artichokes, asparagus, beans (including black eyed peas and soybeans), beets (garden variety), turnips & rutabagas (includ. tops), beets sugar (incl. tops), broccoli, brussel sprouts, kohlrabi, cabbage & cauliflower, carrots, horseradish, parsnips & radishes (incl. tops) celery, collards, kale, mustard greens, spinach & Swiss chard, corn grain (inc. sweet, field and pop corn), corn fodder or forage, cucumbers & summer squash, egg plant, peppers & pimentos, endive (escarole), lettuce and salsify, melons (incl. cantaloupes, muskmelons, water melons) pumpkins, winter squash, Okra, onions (includ. leeks, shallets & garlic), parsley & watercress, peanuts, pears and cowpeas (includ. oats, rye, barley, wheat and rice), buckwheat, grain forage, nuts (includ. pecans, almonds, hazelnuts, walnuts & hickory nuts) Legumes for forage (includ. clover, alfalfa, soybean hay, peanut hay and lespedeza), grass crops (pasture and range grass, timothy, grass hay), mint, spearmint and peppermint, sorghums, sorghum forage, cherries.

Withdrawn July 5, 1955 (includes withdrawal of both Aldrin & Dieldrin).

Allethrin	7/7/55	7/1/55	Food Machinery & Chemical Corp., Middleport, N. Y.	

Tolerance:

Be exempted from the requirement of a tolerance when used in the production of fruits & veg.

Aramite	2/25/55	2/17/55	U. S. Rubber Co., New York	2 parts

Commodities:

Alfalfa, apples, blueberries, cantaloupe, celery, cucumbers, grapes, grapefruit, lemons, muskmelon, oranges, peaches, pears, plums, soybeans, sweet corn, tomatoes, watermelons.

Chemical	Fed. Reg. Date	Date Acknowledged	Company Requesting Tolerance	Tolerance
				5 parts

ARAMITE CONTINUED

Green beans, raspberries, strawberries.

Aramite	6/29/55	6/23/55	U. S. Rubber Co., Amended above petition to— New York	1 part

Commodities:

Alfalfa, apples, blueberries, cantaloupe, celery, cucumbers, grapes, grapefruit, lemons, muskmelons, oranges, peaches, pears, plums, soybeans, sweet corn, tomatoes, watermelons, green beans, raspberries, strawberries.

Calcium Cyanide	9/15/55	9/8/55	American Cyanamid Co., New York	25 parts

Commodities:

Wheat, barley, rice, rye and corn.

Captan	5/20/55	5/16/55	Calif. Spray Chem. Corp., Richmond, Calif. and Stauffer Chemical Co., Chauncey, N. Y.	15 parts

Commodities:

Citrus Fruits (grapefruit, lemons, limes, oranges & tangerines), pineapples, beans (green beans, lima beans, black eyed peas), peas, potatoes. 20 parts

Apples, pears, quinces, grapes, strawberries, cucumbers, summer squash, eggplant, peppers, melons (cantaloupes & watermelons), pumpkins, winter squash, tomatoes. 25 parts

Peaches, nectarines, apricots, mangoes, plums, prunes, celery, collards, spinach, lettuce. 40 parts

Cherries (sweet and sour).

ANOTHER UNION BAG CONTRIBUTION TO BETTER PACKAGING IN MULTIWALL BAGS

Union's red rayon looper thread gives our customers faster, easier bag opening... ...at no upcharge to us

SO THAT YOUR CUSTOMERS can open your Multiwalls more easily, Union now offers rayon-sewed bags with a red colored looper thread—*without a premium.*

When Union Sewn Multiwalls are closed with a white rayon thread for the needle, red is used for the looper thread. Even if a bag becomes discolored in transit or storage, your customer need only cut the thread back two stitches and the red looper becomes visible for unravelling and easy opening.

Union Bag is the first Multiwall Manufacturer to provide this added service without extra charge.

UNION MULTIWALL BAGS

WHEN YOU GET DOWN TO CASES, UNION SHOWS THE WAY

UNION BAG & PAPER CORPORATION
WOOLWORTH BUILDING, NEW YORK 7, N. Y.

Chemical	Fed. Reg. Date	Date Acknowledged	Company Requesting Tolerance	Tolerance
Chlordane	8/5/55	7/29/55	Velsicol Corp., Div. of Arvey Corp., Chicago, Ill.	0.3 part
Commodities: Alfalfa, clover, sweet clover, lespedeza, grass, sweet potatoes, meat.				
Chlorobenzilate	5/17/55	5/13/55	Geigy Chem. Corp., New York	8 parts
Commodities: Apples, cantaloupes, lemons, oranges, pears.				
Dieldrin	4/15/55	4/11/55	Shell Chemical Corp., New York Amended from 0.1 to	1 part
Commodities: Apples, pears, apricots, cherries and onions.				add. tol. 1 part
Avocados & papayas, berries of the bramble type, blueberries, citrus fruit (includ. grapefruit, lemons, oranges & tangerines), cranberries, currants, dates, figs, gooseberries, grapes, guavas, mangoes, pineapples, plums, prunes, strawberries, artichokes, asparagus, beans (includ. black eyed peas & soybeans), beets (garden variety), turnips and rutabagas (includ. tops), beets, sugar (includ. tops) broccoli, brussel sprouts, kohlrabi, cabbage & cauliflower, carrots, horseradish, parsnips & raishes (includ. tops), celery, collards, kale, mustard greens, spinach & Swiss Chard, corn, grain (includ. sweet, field & pop corn), corn fodder or forage, cucumbers & summer squash, eggplant, peppers & pimentos, endive (escarole), lettuce, salsify, melons (includ. cantaloupes, muskmelons, watermelons), pumpkins & winter squash, okra, parsley & watercress, peanuts, peas and cowpeas (includ. forage), potatoes & sweet potatoes, tomatoes, grains (includ. oats, rye, barley, wheat, rice), buckwheat, grain forage, nuts (includ. pecans, almonds, hazelnuts, walnuts, hickory nuts), legumes for forage (includ. clovers, alfalfa, soybean hay, peanut hay, lespedeza), grass crops (pasture & range grass, timothy, grass hay), mint, spearmint, peppermint, sorghum, sorghum forage.				

Chemical	Fed. Reg. Date	Date Acknowledged	Company Requesting Tolerance	Tolerance
EPN **Ferbam** **Zineb** **Ziram**	8/18/55	8/11/55	E. I. du Pont de-Nemours & Co., Wilmington, Del.	
Commodities:				
Grapes, olives, tomatoes, onions & sugar beets (includ. tops).				3 parts
Pecans, walnuts, almonds & cottonseed.				0.5 parts
Almonds				0.1 part
Mushrooms.				7 parts
Almonds & pecans.				0.1 part
Strawberries.				7 parts
Glyodin	8/24/55	8/18/55	Union Carbide & Carbon Corp. New York	5 parts
Commodities: Peaches.				
Heptachlor	3/22/55	3/15/55	Velsicol Corp., Div. of Arvey Corp., Chicago, Ill.	0.1 part
Commodities: Alfalfa, clover & sweet clover, beets (includ. sugar beets), cabbage, brussel sprouts, kohlrabi & cauliflower, corn, cotton, pasture & range grass, onions, peanuts, peas, sugar cane, sweet potatoes, turnips.				
Karmex W	7/8/55	7/1/55	E. I. du Pont de-Nemours & Co., Wilmington, Del.	3 parts
Commodities: Asparagus, sugar cane, pineapple, onions, spinach, cottonseed.				
Karmex DW	7/8/55	7/1/55	E. I. du Pont de-Nemours & Co., Wilmington, Del.	3 parts
Commodities: Sugar cane, pineapple, cottonseed.				

Chemical	Fed. Reg. Date	Date Acknowledged	Company Requesting Tolerance	Tolerance
Malathion	7/21/55	7/5/55	American Cyanamid Co., New York	8 parts
Commodities: Apples, pears, avocados, blueberries, cranberries, strawberries, mangoes, peaches, apricots, guavas, cherries, plums, prunes, grapes, beans, peas, broccoli, brussel sprouts, rutabagas, turnips, beets, cucumbers, squash (summer), melons, eggplant, peppers, onions, potatoes, tomatoes, walnuts, pecans, citrus, dates, pineapple, celery, cauliflower, cabbage, mustard, kale, spinach, lettuce, barley, wheat, oats, alfalfa, clover, pasture grass, passion fruit.				
Maneb	7/9/55	7/1/55	E. I. du Pont de-Nemours & Co., Wilmington, Del.	7 parts
Commodities: Apples, cranberries, figs, grapes, peaches, beans, carrots (with or without tops) or carrot tops, celery, cucumbers and summer squash, melons (includ. cantaloupes & muskmelons) and winter squash, onions, peppers, and eggplant, spinach, tomatoes.				
Potatoes and almonds.				0.1 part
Methoxychlor	8/23/55	8/16/55	E. I. du Pont de-Nemours & Co., Wilmington, Del.	125 parts
Commodities: Grass crops (pasture & forage grasses) following legumes for forage: alfalfa, clover, cowpeas, peanuts, soybeans.				
Carrots (with or without tops) or carrot tops, currants, gooseberries, mint, peanuts.				14 parts
Meat.				3 parts
Grains (dried seed of cereal grasses).				2 parts
Methyl Bromide	8/17/55	8/9/55	Dow Chemical Co., Midland, Mich.	5 parts
Commodities: Apples, pears & quinces.				
Onions.				10 parts
Tomatoes.				20 parts
Eggplants.				30 parts
Beets.				50 parts
Beans, green beans, snap beans, lima beans, black eyed peas.				50 parts
Cocoa beans.				50 parts
Wheat, rice, rye, oats, barley, corn & grain sorghum.				50 parts
Sweetpotatoes.				50 parts
Alfalfa, hay.				75 parts
Peanuts.				75 parts
Potatoes (Irish, white).				75 parts
Turnips or rutabagas.				75 parts
Pecans.				75 parts
Cottonseed.				200 parts
Parathion	8/30/55	8/23/55	American Cyanamid Co., New York	1 part
Commodities: Alfalfa, barley, clover, corn forage, hops, oats, olives, pangola grass, pea forage, timothy, vetch, wheat.				
Phygon	6/4/55	5/31/55	U. S. Rubber Co., c/o Arthur Dry & Dale New York	3 parts
Commodities: Celery and tomatoes.				
SES	2/4/55	2/1/55	Union Carbide & Carbon Corp., New York	2 parts
Commodities: Asparagus, radishes, cabbage, lettuce, eggplants & peppers.				3 parts
Field corn, sweet corn and onions.				6 parts
Strawberries, potatoes, beans, peanuts, peanut hulls, and peanut hay.				
Sulphenone	7/27/55	7/21/55	Stauffer Chemical Co., New York	15 parts
Commodities: Apples, peaches and pears.				
Systox	4/29/55	4/22/55	Chemagro Corp., New York	0.75 part
Commodities: Apples, pears, oranges, strawberries, broccoli, brussel sprouts, cabbage, cauliflower, muskmelons, potatoes, English walnuts.				

Only two TRITON emulsifiers needed for better agricultural formulations

TRITON X-151 and TRITON X-171 emulsifiers combine the ability to solve many emulsion problems with improved color, solubility, and storage stability. Formulators can prepare almost any type of emulsifiable concentrate with *only these two* emulsifiers. The toxicants in the illustration are but a few of the many that can be used with TRITON X-151 and X-171.

Here are just three of the benefits you can expect when you standardize on the TRITON twins:

Better Formulations—TRITON X-151 and TRITON X-171 give you emulsifiable concentrates with better clarity and improved spontaneity. Storage stability is also outstanding inasmuch as the non-ionic portion of the TRITON twins is based on breakdown-resistant ethers. Concentrates are therefore better able to resist the excessive acidic conditions which may develop during storage.

Simplified Operations—Only these two TRITON products are required for a wide variety of toxicant-solvent systems and water hardness conditions. This simplifies inventory and eliminates waste if solvents or pesticides are later changed.

Lower Costs—Compare TRITON emulsifiers at equal cost concentrations with other products. You will prove to yourself that TRITON X-151 and X-171 are more economical.

Write us for samples and additional information; investigate the many advantages of TRITON X-151 and TRITON X-171 now.

TRITON and RHOTHANE are trade-marks, Reg. U.S. Pat. Off. and in principal foreign countries.

CHEMICALS FOR AGRICULTURE

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

Technical SECTION

Seven Urea Processes Compared, Technically and Economically

WITH three new urea plants due to come on-stream in the near future and three more put in operation within the last 18 months, interest in the field has risen to a new peak. Seven processes that are used commercially today are:

(a) Once Through
(b) Hot Gas Recycle
(c) Solution Recycle
(d) Pechiney (oil slurry recycle)
(e) Inventa
(f) Chemico
(g) Montecatini

These seven variations of the basic procedure (reaction of one mol. of carbon dioxide with two mols of ammonia to yield ammonium carbamate; the carbamate then decomposing to form urea and water) represent attempts to solve operating difficulties and to boost efficiency and yields.

Going from ammonium carbamate to urea is a reversible reaction. Dropping the pressure, but still keeping it higher than the vapor pressure of urea-carbamate melt, shifts the equilibrium to favor urea production. In processing, the maximum conversion of ammonium carbamate to urea runs 40 to 50 percent per pass. Carbamate not converted to urea, dissociates back to ammonia and carbon dioxide. For a process to be competitive, the unconverted gases must be recovered and either used elsewhere or recycled. Recycling appears to be the most attractive alternative and is used, in one form or another, in all but one of the various methods.

The first two processes listed are the oldest, and until recently were considered obsolete. In new construction in the U. S., processes using the newer modifications have gotten the major emphasis. However, plants using these processes are still being constructed and operated throughout Europe and Asia.

Of the U. S. plants, Allied is reported to use the Once Through process along with its own improvements. Allied's two plants—one at South Point, Ohio, with about 85,000 tons/yr. capacity and one at LaPlatte, Neb., which came onstream July, 1954 with about 105,000 tons/yr. capacity—represent the greatest total capacity of any current urea producer.

DuPont, whose 150,000 tons/yr. installation at Belle, W. Va., is the oldest and largest in the country, uses the Solution Recycle process with improvements and modifications.

All of the new plants-such as Deere's, which came onstream last November at Pryor, Okla., with 95,000 tons/yr. capacity and Grace Chemicals' Memphis, Tenn., plant, which added its 55,000 tons/yr. to the total U. S. capacity last February —use one of these modifications.

Both Deere and Grace use France's Pechiney process (see *Agricultural Chemicals* Aug. 1955, Tech News).

Plants now being built—Shell Chemical Corp. at Ventura, Calif., Thunderbird Corp., at Kyrene, Ariz., and Standard Oil of Ohio at Lima, Ohio—or in the financing stages, plan to use the newer processes.

Shell will use Italy's Montecatini process in a 100-tons/day plant which it aims to put into operation by next September—in time for next year's fertilizer season. The Swiss Inventa process will get its first U. S. trial in the 120-ton/day plant which Standard Oil of Ohio has slated for completion at the end of this year. Chemico's process has yet to be employed in this country, although it is used by the Sumitomo Co., in a 120-tons/day plant at Niihama, Japan.

Of the estimated market for urea (about 330,000 tons for 1955), fertilizer use represents 200,000 tons of the total. Animal feed takes approximately 70,000 tons per year. How the Competitive Urea Processes Compare Today, William H. Tonn, Jr., *Chemical Engineering*, October, 1955.

•

Maleic Hydrazide on Beets

Tests on sugar beets treated with maleic hydrazide showed significant reductions in sugar loss (from 10.5 per cent to 1.33 per cent loss in 48 days) in studies completed in France.

Maleic hydrazide was used in the form of a liquid containing 30 percent of the diethanolamine salt, which was dispersed in water with the aid of a wetting agent to give a solution of 2.5-16 percent, and sprayed on the leaves 15 to 22 days before harvesting. No significant effect on the yield of beets was found. "Preservation of Sugar Beets Treated with Maleic Hydrazide," Robert Gautheret, Roger Longchamp, J. Dubourg, and R. Saunier, *Sugar Industry Abstracts*, v. 15, #130.

•

Micronutrient Fertilization

The effect of NPK fertilizers with addition of small amounts of boron, copper, manganese and zinc was studied in experiments in Germany. On soils deficient in copper, better results were obtained with applications of copper sulfate to the soil, than in the use of the same amount of copper in NPK fertilizers containing micronutrients. On soils deficient in manganese, only high rates of manganese were effective. In 29 of 30 trials, no advantage was found in the use of NPK fertilizer containing micronutrients compared with separately applied micronutrients. "Fertilizing with Micronutrient," C. Pfaff, H. Roth, and A. Buckner, *Landwirtsch. Forsch*, 7, 73-9 (1955); through *Chemical Abstract*.

Liquid Sulfur Dioxide

Canadian Industries Ltd., at Copper Cliff, Ontario, makes liquid sulfur dioxide in a plant producing 90,000 tons of product per year. International Nickel Co. of Canada's copper plant adjacent to CIL supplies the SO_2 gas (product of oxidation of copper sulfide ores) and CIL compresses and cools the gas to form the liquid.

The three process units in the operation are:

(a) Liquid air unit. This is an Oxyton design, built by CIL, with a capacity of 325 tons of 95 per cent oxygen per day. Nitrogen expansion provides the refrigeration; no ammonia cycle is used.

(b) Oxygen flash-smelting furnace. Copper ore concentrates are injected with oxygen into an Inco-designed furnace, producing matte, slag and a gas containing 75 per cent SO_2.

(c) SO_2 compression. The gas comes to CIL's plant by pipeline at around 400 psig, and is filtered, dried, compressed to a liquid and cooled. Liquid Sulfur Dioxide, *Chemical Engineering*, October, 1955.

•

Maize Fumigation in Africa

Bulk methyl bromide fumigation of bagged maize is expected to kill growth stages of insect pests and save thousands of pounds of maize previously destroyed in East Africa. Fumigation experiments conducted by D. W. Hall, Colonial Liaison Officer to the Ministry of Agriculture's Infestation Control Division, have shown that two pounds of methyl bromide gas per 1,000 cubic feet for 24 hours gives complete kill of the egg and pupa stages.

Method of fumigation currently being carried out consists of covering the maize stack with air-tight sheets of a material used during the war for anti-aircraft balloons, and passing the gas in through pipes.

A. A. Haller, Maize and Produce Controller, said that other experiments in preventing infestation of maize travelling in railway trucks and in farmers' cribs are being conducted. *East African Trade and Industry*, August, 1955.

Report Boll Weevil Developing Resistance to Chlorinated Hydrocarbon Insecticides

TWO entomologists connected with the Louisiana Experiment Station, Baton Rouge, La., John S. Roussell and Dan Clower, report in a publication of the station, Circular No. 41, September 1955, that resistance to the chlorinated hydrocarbon insecticides has been detected over the past season in the boll weevil. They observe that boll weevil became difficult to control in some areas of Louisiana during the late summer of 1954, and that adverse climatic conditions, including high temperatures, high wind velocities and low humidities were credited that year for responsibility for the poor results. Under entirely different climatic conditions in 1955 they indicate that even more difficulty has been encountered in securing control.

Their laboratory findings over the past two months, supported by work in the field, they now believe, support the belief that "a high degree of resistance to the chlorinated hydrocarbon insecticides has developed in boll weevil populations in some areas of Louisiana." They define the areas as follows: (1) Northeast Louisiana to include Waterproof, St. Joseph, Tallulah and large areas of East Carroll Parish; (2) Ouachita River Valley south of Monroe; (3) Red River Valley, including parts of Caddo, Red River, Bossier, Grant, Natchitoches, and Rapides Parishes.

In making their tests, boll weevil infested squares were collected from several trouble areas in Louisiana. In addition, three collections were made in South Louisiana where relatively small acreage of cotton is grown and little if any effort has been made to control the boll weevil. Two types of laboratory tests were conducted; cage tests, and topical application in which a known amount of insecticide was delivered in a measured dose to the individual boll weevil.

Three randomized replicated field plot tests were also conducted which corroborated the laboratory results. One was located at St. Joseph in which calcium arsenate was the only one of four treatments that effectively reduced the boll weevil population. The three insecticide combinations which they report failed to control boll weevils were Toxaphene-sulfur Dieldrin - DDT-sulfur and BHC-DDT-sulfur. All materials were applied as dusts.

A second test was conducted at Natchitoches. In this experiment, Dieldrin - DDT, Heptachlor - DDT, Endrin, and Toxaphene failed to control boll weevil, it is reported, whereas Bayer's 17147, an experimental phosphate chemical, gave outstanding control. All materials in the Natchitoches test were applied as sprays.

The third test was conducted at Church Point. Endrin, Toxaphene, Dieldrin-DDT and Bayer's 17147 all gave excellent control in this test.

Discussing their results, Messrs. Roussel and Clower report that their laboratory cage tests "clearly show that boll weevils collected in areas where growers have failed to obtain control with repeated applications of chlorinated hydrocarbon insecticides, have developed a high degree of resistance to these insecticides." The most striking feature of these tests, they point out, was the very slight increase obtained in control of the resistant cultures as the rate of insecticide application was increased from 20 to 40 lbs. per acre. All 5 chlorinated hydrocarbon insecticides, they note, responded essentially the same under test.

By contrast, comparable control of both susceptible and resistant cultures was obtained with calcium arsenate and with Shell's experimental phosphate compound 2046. Boll weevils of both the susceptible and resistant cultures also responded alike to topical applications of Bayer's 17147, a phosphate insecticide.

They cite as further evidence of the high order of resistance shown to chlorinated hydrocarbon insecticides the large amount of Endrin which was necessary to control a resistant culture. The amount of Endrin re-

quired to control 50% of the resistant culture was approximately 112 times that required for the susceptible culture.

The randomized plot field tests, Messrs. Roussel and Clower believe, offer further proof that resistance to chlorinated hydrocarbon insecticides has developed in the boll weevil. In contrast to the test in the Church Point area, where effective control was obtained all season by all materials, chlorinated hydrocarbons failed to control boll weevils in tests at St. Joseph and Natchitoches. In the St. Joseph test, calcium arsenate gave effective control, while at Natchitoches, Bayer's 17147 was the only insecticide tested that gave adequate weevil control.

Five tables of supporting data accompany Circular No. 41 issued by Louisiana State University and Agricultural and Mechanical College, Louisiana Experiment Station.

Views Of Other Entomologists

STATE, federal and commercial entomologists in other parts of the cotton belt have not corroborated the Louisiana findings and opinions. There is a disposition in some quarters at least to await further evidence before accepting the conclusion that resistance has been proved to exist. One experienced worker in the Texas field writes as follows: "we reserve our opinion relative to the resistance of the boll weevil to chlorinated hydrocarbons until further information is obtained. The results of tests now being conducted at our Laboratory may furnish additional information on this problem.

"We are also interested in determining whether or not this apparent tolerance to chlorinated hydrocarbons will be shown in overwintered weevils next spring. It seems to us that we need considerable additional information before this problem can be definitely solved. We have no information which leads us to believe we have boll weevils resistant to the chlorinated hydrocarbons in this State."

Dr. K. P. Ewing, in charge Cotton Insects Section, U. S. D. A. Agricultural Research Service, Entomology Research Branch, Beltsville, Md., writes as follows:

"Our Cotton Insects Section began special laboratory studies early in August to determine, if possible, whether boll weevils in certain localized areas have developed resistance to the chlorinated hydrocarbons. Most of these studies are being conducted at our College Station, Texas, laboratory. Weevils from Mississippi and Louisiana are being shipped there weekly and compared to weevils collected in several localities in Texas. The tests will continue for some time yet, and at the end of the test-period results will be summarized and we hope to be able to draw conclusions and publicize the information. Until that time, I prefer not to make a positive statement on the subject of boll weevil resistance.

"Between August 29 and October 3, I visited a good many cotton fields in North Carolina, South Carolina, Mississippi, Louisiana, Arkansas, and Texas, and conferred with many entomologists and farmers.

"Over the Belt, as a whole, weather and plant growth conditions were extremely favorable for weevil multiplication, and in many localities unfavorable for effective insecticide applications. There were extremely high weevil populations during most of the growing season and only by accurate, timely applications were weevils brought under control. In some instances and in a few localities they were not brought under control. In high population, "emergency" weevil-years there are always individual farmers who make a failure of weevil control. That has always been the case and probably will continue unless simpler, less expensive control measures are discovered which are not so dependent upon favorable weather.

"Looking at the boll weevil portion of the Cotton Belt as a whole and assuming that the Crop Reporting Board's estimate of October 1 is correct, and considering that in most areas this was a real "boll weevil year," then I believe we will have to concede that a high percentage of the farmers across the Belt made a success of their weevil control operations.

"On my recent trip I believe I saw more "two-bale per acre" cotton than I've ever seen before; and most of this was on farms where a hard, strenuous, and relatively expensive fight had been waged against the weevil with insecticides. On the other hand, I've also seen in a few localities too many farms potentially capable of producing from 1½ to 2 bales per acre, and where an expensive fight was waged, that would produce only from ¼ to ¾ bale per acre. There are many factors that could have entered into the failures to control the boll weevils in a year like this, and certainly, with the information at hand, we would not exclude the possibility of resistance existing in localized areas."

One commercial source describes the Louisiana conclusions as "based on wholly inadequate data." It is pointed out by this observer that in the particular "hot spots" where trouble was encountered in securing effective control, counts of as high as 500,000 weevils per acre were common—a tremendous weevil population. Even if insecticide applications killed 98% of the weevils in the fields, this observer emphasizes, it is obvious that there would still be an extremely heavy population left—quite enough to cause excessive damage to the crop. It is pointed out that data collected as far back as 1947, 1948 and 1949 indicated that it is much harder to kill weevils late in the season, and that the current Louisiana results may simply demonstrate the difficulty of late season control rather than any development of real resistance.

Reporting on conditions in Arkansas, Charles Lincoln, entomologist with the Arkansas Agricultural Experiment Station at Fayetteville, writes as follows:

"Over the great part of Arkansas boll weevils are not resistant. A highly successful control program in 1955, well documented by scouting reports, etc., fully substantiates this. There are some suspicious cases in Chicot County, our southeastern corner county, and possibly elsewhere. They cover such a limited area that they cannot be taken too seriously at present, on the basis of field reports. We have no laboratory data.

"I have visited the experiment stations at St. Joseph and Tallulah,

(*Turn to Page* 79)

SYSTOX*

now nationally accepted for control of aphids and mites on

PEARS
APPLES
COTTON
CABBAGE
ORANGES
WALNUTS
BROCCOLI
POTATOES
MUSKMELONS
CAULIFLOWER
ORNAMENTALS
STRAWBERRIES
SEED ALFALFA
BRUSSELS SPROUTS
NON-BEARING FRUITS

* REGISTERED TRADEMARK OF CHEMAGRO CORPORATION

CHEMAGRO CORPORATION

101 PARK AVENUE, NEW YORK, N. Y.

INDUSTRY Patents

The data listed below is only a brief review of recent patents pertinent to the readers and subscribers of this publication.

Complete copies of these patents may be obtained by writing to the publisher of this magazine and remitting 50¢ for each copy desired. For orders received outside of the United States the cost will be $1.00 per copy.

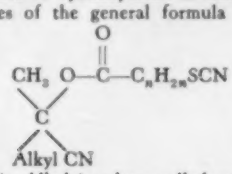
2,714,555. Fertilizer and Method of Making Same. Patent issued August 2, 1955, to Carlisle H. Bibb and Reid H. Leonard, Pensacola, Fla., assignors to Newport Industries, Inc., Pensacola, Fla., a corporation of Delaware. A method which comprises subjecting wood to hydrolytic conditions of aqueous acid under pressure to obtain a moist hydrolyzed mass containing substantial amounts of lignin residue and to convert at least one-fourth of the original weight of the wood to sugars, removing water-soluble material from the mass by washing the same while retaining the organic solvent soluble ingredients, dissolving *x* molar equivalents of urea in the moist hydrolyzed mass to react the same therewith, then reacting the urea-containing mass with (½ to 1) *x* molar equivalents of formaldehyde, and recovering a fertilizer product comprising a urea-formaldehyde condensation product dispersed in and partially combined with said hydrolyzed material.

2,715,059. Phosphatizing Composition. Patent issued August 9, 1955 to Daniel E. Miller, East Los Angeles, Calif., assignor to Kelite Products, Inc., Los Angeles, Calif., a corporation of California. A process of producing a dry orthophosphate compound as discrete particles, which process comprises agitating granular anhydrous sodium acid pyrophosphate together with substantially 85% phosphoric acid in proportions of 1 part of the anhydrous sodium acid pyrophosphate to between 1 and 2 parts by weight of the 85% phosphoric acid, the agitation being conducted at a temperature of about 140°F.

2,715,599. Method of Making Insecticidal Calcium Arsenate Batch.. Patent issued August 16, 1955 to John S. Les Veaux, Middleport, and Calvin M. Tidwell, Medina, N. Y., assignors to Food Machinery and Chemical Corp., San Jose, Calif. In the method of making insecticidal calcium arsenate by adding arsenic acid to an aqueous lime slurry in batch operation while the whole admixture is subjected to violent agitation, the improvement which comprises adding the arsenic acid to the lime in an amount insufficient to neutralize completely the lime in the batch and continuing such arsenic acid addition until the batch contains some unreacted lime which is less than 1% by weight of the original lime added and then adding to the slurry sufficient amount of an aqueous solution of a water soluble weakly acidic salt of a metallic ion other than calcium and having a valence greater than one to produce in the slurry a pH between 7.5 and 12 and then adding additional increments of such salt solution until the pH of the batch remains constant for one-half hour in that range.

2,715,562. Insecticidal Calcium Arsenate and Method of Making Same. Patent issued August 16, 1955 to John F. Les Veaux, Middleport, N. Y., assignor to Food Machinery and Chemical Corp., San Jose, Calif. In the method of making an insecticidal calcium arsenate by chemically reacting arsenic acid with an aqueous suspension of hydrated lime, the steps which comprise recirculating the suspension of hydrated lime from a reservoir containing the main bulk of the suspension through a relatively small main reaction chamber where most of the reaction occurs and back to the reservoir; gradually adding the arsenic acid to, and thoroughly mixing it with, the stream of lime suspension as it passes through the reaction chamber and continuing the aforesaid procedure until substantially all of the hydrated lime in the suspension has been converted to calcium arsenate and then discontinuing the process, the rate of addition of the arsenic acid to the hydrated lime in the reaction chamber being sufficiently low to maintain an excess of unreacted hydrated lime in the reaction chamber throughout substantially the whole of the process, until the conversion of the lime to calcium arsenate is completed; the suspension of hydrated lime in circulation during the reaction and until the reaction is completed containing both the reaction product of the reactants and the excess lime.

2,716,626. Thiocyano Fatty Acid Esters of Methyl Alkyl Ketone Cyanohydrins and Insecticides Containing Them. Patents issued August 30, 1955 to Henry Martin, Zurich, Switzerland, assignor to Cilag Limited, Schaffhausen, Switzerland. New thiocyano fatty esters of cyanohydrins of methyl alkyl ketones of the general formula



wherein Alkyl is a lower alkyl radical and n is an integer from 1 to 5.

2,717,884. Soil Conditioning Composition. Patent issued September 13, 1955 to Henry Leighton Morril, Clayton, Mo., assignor to Monsanto Chemical Company, St. Louis, Mo., a corporation of Delaware. A soil conditioning composition which comprises an ammonium salt of a copolymer of isobutylene and maleic acid containing admixed therewith a glycol having the formula

HO—R—OH

wherein R is selected from the group consisting of alkylene and oxyalkylene radicals having molecular weights between 42 and 116 and wherein the hydroxyl groups are attached to separate carbon atoms.

2,719,160. Production of Fungicidal Cyclohexadienone Derivatives. Patent issued September 27, 1955 to Friedrich Becke, Bad Duerkheim, and Oskar Flieg, Limburgerhof (Pfalz), Germany, assignors to Badische Anilin- & Soda-Fabrik Aktiengesellschaft, Ludwigshafen (Rhine), Germany. A process for the production of fungicidal products which comprises heating to reflux a solution of hexachloro-cyclohexadiene-(1,4-one-(3) with a secondary amine selected from the group consisting of pyrrolidine, piperidine, lower dialkylamines and N-methallyl-cyclohexylamine.

INDUSTRY TRADEMARKS

Crown Z, drawing of crown with letter "Z" in "C." For mulch paper used as an aid in the growth of plants. Filed Jan. 17, 1955, by Crown Zellerbach Corp., San Francisco. Claims use since Dec., 1953.

Soiltone in outline letters. For organic fertilizers. Filed Jan. 21, 1955, by Soiltone Fertilizer Co., Omaha, Neb. Claims use since Mar. 1, 1947.

Caronex in heavy letter, caps and lower case as shown. For plant growth aid. Filed Jan. 12, 1955, by Hydroponic Chemical Co., Copley, Ohio. Claims use since Dec. 20, 1954.

Plant-A-Bar in heavy letters, for fertilizer materials formed into various shapes and having seeds embedded therein. Filed P. R. 4-3-53; Am. S. R. 11-24-54 by The Ferro Corp., Cleveland. Claims use since Jan. 28, 1953.

(Continued on Page 101)

PUTTING SELL IN CELERY

The object of every truck farmer is to raise better crops that will sell better in the nation's markets. Modern commercial fertilizers help him do just that.

Potash, an important component of these fertilizers, not only enriches the soil, builds crop resistance to disease and increases product yield, it helps improve the *quality* of crops, too. It helps put more sell in celery, for instance.

U. S. P.'s high-grade muriate of potash has the highest K_2O content and is free-flowing and non-caking—important advantages in the manufacture of fertilizers that help make vegetables a more attractive buy for the American dinner table.

HIGRADE MURIATE OF POTASH 62/63% K_2O
GRANULAR MURIATE OF POTASH 60% K_2O MIN.

UNITED STATES POTASH COMPANY

INCORPORATED

30 Rockefeller Plaza, New York 20, N. Y.

Southern Sales Office
Rhodes-Haverty Building, Atlanta, Georgia

REG. U.S. PAT. OFF.

WASHINGTON Report

by
Donald G. Lerch
Cornwell, Inc., Washington, D. C.
(Agricultural Chemicals Washington Correspondent)

THE Miller Amendment is taking hold. Day by day it is penetrating farther into the pesticide field and it is increasingly apparent this law will have a vital effect on the future course of industry and the whole field of pest control.

Agricultural experiment stations throughout the Nation are face to face with the problem of the establishment of tolerances prior to the issuance of recommendations to growers in their respective states. Agricultural experiment station directors have these three questions to answer: 1) are all recommendations for pest control covered by the establishment of legal tolerances? 2) Will the recommended spray schedule of amounts and timing result in residues which come under legal standards? 3) Can residue data be obtained to further document data presented by companies filing under the Federal Act?

Anybody who has ready answers to all these questions would certainly be entitled to far more than the "$64,000 prize." The problem from the point of view of the agricultural experiment stations is little short of terrific. Their officials must rely on the basic pesticide producers for much of the technical data concerning the chemicals used. In all probability, individual companies will have much more information on the status of their materials than even the U. S. Department of Agriculture in Washington which must, of necessity, keep abreast of the whole field and which is limited in the speed of disseminating information by the very nature of government itself.

Furthermore the agricultural chemicals upon which tolerances have been established are used under widely varying conditions from county to county and state to state. More than this, the speed of residue weathering varies depending on temperature, sunlight, rainfall, and the like. Yet agricultural experiment stations have obligations and liabilities to the growers within their states to ensure that recommendations they make will not result in violations of the law.

The problem is a big one right now because at this time experiment stations are reviewing their pest control recommendations preparatory to issuing new findings for the 1956 growing season which will be the first agricultural year under the Miller Amendment. Meetings and conferences during the next few month will determine the positions experiment stations take on these questions and how liberal or restrictive they are with the recommendations they make to growers.

* * *

Another aspect of the Miller Amendment concerns interpretation of the Food and Drug Administration's action in the case of Aramite and the U. S. Rubber Company. Food and Drug's decision to accept one part per million undoubtedly required considerable courage. The general reaction here in Washington seems to be favorable. The significant parts of the decision appear to be these: 1) the Food and Drug Administration accepted the decision of the committee of scientists assembled under provisions of the Amendment, 2) the Food and Drug Administration scrupulously avoided any attempt to influence the committee's findings, 3) the need for further research was stressed by the Food and Drug Administration and recognized by the U. S. Rubber Company which already has additional studies underway. Members of the scientific committee, selected by the National Research Council, who recommended the tolerance of one part per million under procedures of the Miller Act are: Dr. H. S. N. Greene, Yale University School of Medicine, Chairman; Dr. L. W. Hazelton, Hazelton Laboratories, Falls Church, Va.; Dr. R. L. Metcalf, University of California College of Agriculture, Riverside, Calif.; Dr. M. H. Seevers, University of Michigan Medical School, Ann Arbor, Mich.; and Dr. A. Tannenbaum, Michael Reese Hospital, Chicago, Ill. 4) companies which follow this route in the future undoubtedly will be called on to supply a tremendous amount of experimental evidence. The complexity of the problem apparently requires a tremendous amount of data in order for scientists to reach a conclusion.

The whole matter of expense therefore becomes of utmost importance, for the more money which must be invested in the development of a product through tolerances and marketing, the greater the risk involved. It would seem that this would tend to limit sharply the number of products reaching the market despite the extensive research programs carried on by chemical companies.

The fees for just "routine" handling of a request for tolerances are no small item for a company marketing a wide range of chemicals. The existing $1,000 fee for filing for a single tolerance can mount quickly when service is requested for several products, and there is no reason to believe that the present fees will not be raised in the future, if the amount of work involved in handling tolerance requests increases. There is a feeling in some quarters that the matter deserves special attention next year. Since the Government provides services for industry without charge,

(*Continued on Page* 96)

What is it?

INDUSTRY News

Pesticide Committee Meets

The Agricultural Research Institute of the National Research Council met October 19th at the Willard Hotel, Washington, D. C., to discuss problems of particular interest to the pesticide industry and extension specialists, regarding pesticides, pesticide tolerances, etc.

Among the participants at this meeting were: A. S. Hoyt, U. S. Department of Agriculture; Charles Palm, Cornell University; W. D. Rankin, U.S.D.A., Food & Drug Administration; L. S. Hitchner, executive secretary of the NAC; W. M. Fifield, University of Florida.

•

2 New Fertilizer Grades for SW

Two new grades of high analysis fertilizer are now available to farmers of the Southwest through the Western Fertilizer Division of Olin Mathieson Chemical Corp., Little Rock, Ark. The company now is producing a 16-8-8 ratio and a 15-30-0 ratio. Both ratios are pelletized, watersoluble Ammo-phos for fertilizers.

•

Enter Agricultural Field

Walter C. Ronk, vice-president of Barnard and Leas Mfg. Co., Inc., Cedar Rapids, Iowa, manufacturer of grain and feed processing equipment, announces the expansion of Barnard and Leas facilities to include agricultural and general chemical processing, plant design and manufacture.

W. R. Stephens has been named manager of the department. He is currently directing the development of B&L "package plants" for producing nitrogen solution fertilizers. Mr. Stephens comes to Barnard and Leas from Trenton Chemical Co., Trenton, Mich., where he was general manager and treasurer.

•

Allied Appoints Hunter, Colvin

Malcolm E. Hunter was recently appointed as assistant to the president of the Nitrogen Division, Allied Chemical & Dye Corp., New York, Walter S. Colvin was named director of agricultural sales.

W. S. Colvin

M. E. Hunter

Mr. Hunter will be responsible for sales, succeeding Fred Techter, who will continue with Nitrogen Division on special assignments. Mr. Hunter has been a sales executive in the Nitrogen Division for five years, and was formerly general sales manager of the fertilizer division of Virginia-Carolina Chemical Corp., Mr. Colvin, has been northern district sales manager, with headquarters at Indianapolis, Indiana.

•

New Calspray Research Center

Leo R. Gardner, manager of the research and development department for the California Spray-Chemical Corp., welcomed guests to the open house held September 23, in the new laboratories of the Bio-screening Section of Calspray's research and development department at Richmond, Calif.

The new laboratory is a part of the company's program for expanded research facilities.

New Florida Ammonia Plant

Re-mark Chemical Co., Inc., Miami, manufacturers of agricultural chemicals, announce the completion of their aqua ammonia conversion plant at Hallandale, Fla. This plant is designed for production of 20-0-0 agricultural grade aqua ammonia, as well as commercial grade materials. The capacity will be 80 tons per day.

•

U of Md. Fertilizer Conf.

A conference for fertilizer manufacturers, dealers and salesmen has been scheduled for November 9th on the University of Maryland campus.

Topics to be discussed include the effect of liquid fertilizers on the fertilizer industry, effects of irrigation on certain fertilized crops, and a review of research projects.

•

NPCA Convention Held

At its 22nd annual convention, held Oct. 17-20 at the Cosmopolitan Hotel, Denver, Colo., the National Pest Control Association, discussed a number of topics concerning marketing, public relations, new technical developments, etc., of interest to the pest control operator.

The following are some of the reports reviewed:

"Legal Aspects of Price Control as Related to a National Association, by S. L. Lind; "Competition and Pricing in a Competitive Market," by H. L. Felton and J. C. Redd; "Recent Progress in Research in Control of Cockroaches," by J. C. Keller; "Insurance and its Effect on the Pest Control Operators," by J. H. Goodman.

Entomologists to Cincinnati

The third annual meeting of the Entomological Society of America is scheduled for November 27-December 1, at the Netherlands Plaza Hotel, Cincinnati, Ohio. A varied program dealing with chemical control investigations, general entomology, physiology and toxicology, etc., is planned for the meeting. Among the invitational papers will be reports on "The Role of Entomology in The Future of Agriculture;" and a symposium on "New Approaches to Systematics."

•

Blaw Knox Fert. Installation

Chemical plants division of Blaw-Knox Co., Pittsburgh, Pa. is now installing a 25 ton per hour granular fertilizer production unit for Land O'Lakes Creameries at Minneapolis, Minnesota. Process consists of continuously screening, weighing, and metering raw materials to a TVA-type ammoniator, granulation, drying, cooling and screening.

Also included in the project are a building to house the equipment, and storage facilities for anhydrous ammonia, nitrogen solution, sulfuric acid and fuel oil. Complete dust and fume scrubbing equipment is an integral part of the operation.

Construction will be completed before the year's end to permit production of all nitrogen grades of fertilizer for the '56 season. The existing batch mix system will be retarded for use on non-nitrogen grades.

•

Bagpak Advances Siegel

A. Siegel has been advanced to eastern division sales manager of bags and paper for the Southern Kraft Division of International Paper Co., New York. Hugh B. Vergara succeeds Mr. Siegel as assistant sales manager.

•

N.C. Weed Conf. Dec. 6-8

The annual meeting of the North Central Weed Control Conference will be held at the Hotel Fontenelle, Omaha, Neb., December 6-8. Dr. Al MacQuiddy, Univ. of Nebraska, will address the membership on the subject of "Weeds and Their Effect on Man;" Samuel Alfend, Kansas City District of the FDA will discuss the Miller Law at the 3-day meeting. Other discussions will deal with problems in control of weeds on field crops, horticultural crops, woody plants, perennial weeds, etc.

•

FDA Tolerance on Aramite

The Food and Drug Administration has established a residue tolerance of one part per million for Aramite,, a miticide made by the Naugatuck Chemical division, United States Rubber Co., when used on certain fruit and vegetable crops.

The decision was based on the recommendation of an advisory committee in the first use of procedures set up by the newly established Miller Pesticide Act. This act outlines a method for settling problems on the use of new pesticides.

As required by this new law, Naugatuck Chemical requested a residue tolerance for Aramite. The company also asked for a review of their petition by an advisory committee as provided in the Miller Act.

A committee, suggested by the National Research Council, reviewed toxicological data submitted by the chemical company and decided that a residue of one part per million on certain crops would be non-hazardous. On the committee were a pathologist, toxicologist, entomologist and two medical men.

The crops on which tolerances have been established for the chemical to be used for mite control are apples, blueberries, cantaloupes, celery, cucumbers, grapefruit, grapes, green beans, lemons, muskmelons, oranges, peaches, pears, plums, raspberries, strawberries, tomatoes, watermelon and sweet corn used for kernels rather than fodder. This decision essentially covers crops mentioned on the chemical's current label. Aramite is also being used on a number of non-food crops where residue tolerances are not required.

No residue of the chemical will be permitted on the forage crops alfalfa or soybeans. FDA said this was in line with its policy that milk should be kept free of any pesticide because of its dietary importance to infants and invalids.

Karabatsos Joins NACA

Kimon T. Karabatsos, former administrative assistant to Rep. A. L. Miller (R., Neb.), has been appointed

K. T. Karabatsos
New member of National Agricultural Chemicals Association staff.

to the staff of the National Agricultural Chemicals Association, L. S. Hitchner, NAC executive secretary announced recently. Mr. Karabatsos' duties will be concerned with legislative and special services.

A native of Fairbury, Nebraska, Karabatsos was graduated from the University of Nebraska in 1949. Prior to joining the staff of Congressman Miller, he was area editor of the Scottsbluff (Nebraska) *Daily Star-Herald*. While on Congressman Miller's staff, he worked on the Miller Bill, now Public Law No. 518.

•

Filth Tolerance in Wheat

The Food and Drug Adminstration announced recently it will tighten sanitary requirements on wheat beginning next July to promote increased cleanliness in the nation's food supply.

The basis of legal action against filth-contaminated wheat will be lowered to the following levels: 1 or more rodent pellets per pint of wheat (liquid measure) or 1% or more of insect-damaged kernels. The change will be put into effect July 1, 1956, to coincide with the beginning of the crop year and thus permit the grain trade time to make the necessary adjustments.

•

IMCC Appointments

Roger Bart has been appointed manager of International Minerals & Chemical Corp.'s research experiment station at Mulberry, Fla. Also announced are the appointments of W. B. Williams as supervisor of chemical process development and F. N. Oberg as supervisor of coordinating services at the Florida experiment station.

NPCA Board of Directors

The National Pest Control Association announced recently the newly elected representatives on its board of directors. Listed by region they are:

Region No. 1, Charles W. Houghton, vice-president to 1957, and Kenneth N. Cook, director to 1957; Region No. 2, Robert G. Bloch and Justin Simon, directors to 1957; Region No. 3, Martin T. Meyer, vice-president to 1957, and A. H. Richards, director to 1957; Region No. 4, William B. Clements, director to 1957; Region No. 5, Myron W. Smith, vice-president to 1957; A. H. Jackson, director to 1956, and Paul K. Adams, alternate director to 1956.

Also, Region No. 6, Joseph De Fiore, director to 1957; Region No. 7, Herman C. Militzer, vice-president to 1957 and Arthur L. Davis, director to 1957. Region No. 8 held no election. Region No. 9, Maurice Oser, vice-president to 1957 and Charles Denny, director to 1957. Region No. 10, Noad W. Corley and Jerome L. Howell, directors to 1957. Region No. 11, Wayne K. Davis, vice-president to 1957 and Robert B. Mosecher, director to 1957. Region No. 12, J. E. Osborn and D. L. Whiteaker tied for the posts of director and alternate director.

•

Nopco Appoints W. C. Mgrs.

Joseph E. Connell and Robert J. Kingsley have been named sales managers of new sales departments set up by the Pacific Division of the Nopco Chemical Co.

The new sales departments are part of Nopco's West Coast expantion program. Earlier this year, Nopco acquired the assets of Griffin Chemical Co., San Francisco, manufacturers of emulsifiers and related products.

•

New Davison Liq. Fert. Plant

Marking the company's entry into the relatively new field of liquid fertilizers, the Davison Chemical Co., Division of W. R. Grace & Co., will build a plant for manufacture of these products on an eight-acre site acquired in Wakarusa, Ind., 18 miles southeast of South Bend.

The plant and its associated marketing activities are projected as a developmental operation on a comparatively large scale, since the plant will have 15 tons an hour capacity, and the area to be served takes in parts of both Indiana and Michigan.

When the plant goes into operation, about March, 1956, it will turn out fertilizer in analyses of 9-9-9, 5-10-10 and 10-5-5. In addition to these liquid products, a warehouse stock, supplied from other Davison plants, will be maintained of Davco granulated fertilizer in bulk and in bags, and in all recommended analyses.

•

Fertilizer Plant in Tokyo

Chemical Construction Corp., New York, has been named by Nihon Gas Kagaku Koagyo, K. K. of Tokyo, Japan to design nitrogenous fertilizer project which will include a 100 ton-a-day ammonia plant and a 90 ton-a-day urea plant. The urea plant will incorporate Chemico's full recycle process while the ammonia plant will be based on high pressure reforming of natural gas.

Rutgers Meeting For Dealers

Rutgers University's annual one-day soils school on Nov. 9 at the College of Agriculture, New Brunswick, N. J., will emphasize the role of organic matter in soils. The meeting has been a popular one, drawing attendance from fertilizer and lime dealers, agents and salesmen.

Among speakers will be Wallace A. Mitcheltree, extension specialist in soils, who is arranging the meeting; Dr. Robert L. Starkey; Dr. David Pramer; Dr. Russell B. Alderfer, and Dr. E. R. Purvis, soils researcher who will present new fertilizer recommendations.

First item of business will be a discussion of expanding the educational program of the dealer group, possibly by forming an association.

New Ag. Chemical Silicate Offered by Johns Manville

Micro-Cel will be produced at the Johns Manville plant at Lompoc, Calif. The plant is expected to be in production early in 1956.

Both fertilizer and insecticide manufacturers may improve their formulations in several ways with a new Johns-Manville product, the company believes. The product is a new line of synthetic calcium silicates, called "Micro-Cel," which J-M announced publicly at a press luncheon in New York last month.

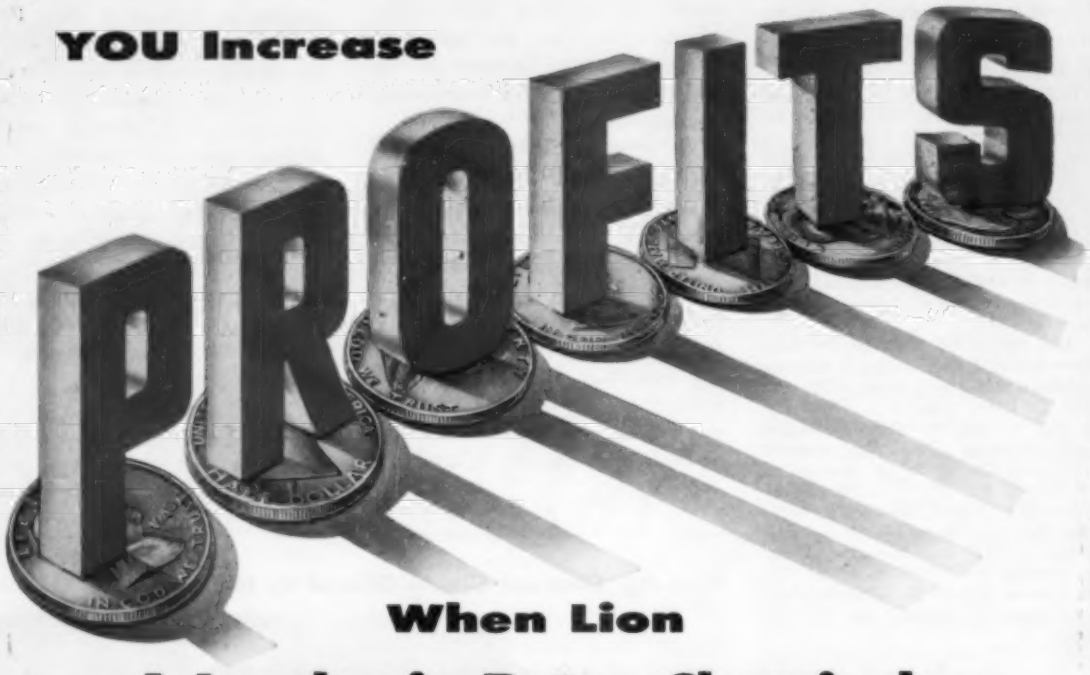
Micro-Cel is produced by the chemical combination of lime and diatomaceous silica. It is a powder, available in specific grades, that is highly absorptive, bulky, essentially inert and with a large surface area and high flowability.

Fertilizer companies, J-M claims, will find it useful as an anti-caking agent. Insecticide formulators, on the other hand, will be able to employ Micro-Cel as an absorbent-grinding aid for high liquid concentrate wettable powders, and for insecticide dusts.

Company spokesmen reported that the following wettable powders already have been formulated successfully with the material and have proved commercially practical: 70% Toxaphene, 15% Aramite, 75% DDT, 50% Heptachlor and 75% Dieldrin. Examples of dry dust concentrates tested in research are 70% Toxaphene, 50% Aramite and 50% Heptachlor.

Micro-Cel now is being produced on a pilot plant basis. It is available in test quantities. Full scale production is anticipated early next year in a new plant at Lompoc, Cal.

YOU Increase



When Lion

- A Leader in Petro-Chemicals -

Supplies Your NITROGEN NEEDS

HERE'S THE LION LINE-UP OF QUALITY NITROGEN FERTILIZER MATERIALS

Lion Anhydrous Ammonia—82.2% nitrogen. Quality guaranteed.

Lion Aqua Ammonia—Ammonia content about 30%—other grades to suit your requirements.

Lion Ammonium Nitrate Fertilizer—Improved spherical pellets. Guaranteed 33.5% nitrogen.

Lion Nitrogen Fertilizer Solutions—Various types to suit your particular manufacturing needs.

Lion Sulphate of Ammonia—White, uniform, free flowing crystals. Guaranteed 21% nitrogen.

Now that the new fertilizer manufacturing season is in full swing, make sure you realize all the profits your plant can produce. *Where you buy* your raw materials can be vital and now, more than ever before, it pays to buy *your nitrogen needs* from Lion—a leader!

Lion nitrogen products are manufactured under rigid controls to meet exacting specifications—ending the costly production delays that result when ingredients vary in quality from day to day. With Lion products, you produce with maximum efficiency and profit—and you maintain the quality standards your customers demand.

Lion also provides an expert technical staff to assist you in solving difficult formulation and processing problems. And, throughout the year, Lion's sales building advertising tells farmers the plant food story—for your benefit. Lion's leadership in customer service stands out, offering you outstanding opportunities for increased profits—and your best season yet!

DISTRICT SALES OFFICES: NATIONAL BANK OF COMMERCE BUILDING, New Orleans, La. • SHEPHERD BUILDING, Montgomery, Ala.

LION OIL COMPANY

CHEMICAL SALES DIVISION

EL DORADO, ARKANSAS

N-P-K Supplies Rising 2.5%

The U. S. Department of Agriculture announced last month that supplies of the three principal plant nutrients—nitrogen, phosphates and potash—in the 1955-56 crop year will exceed the 1954-55 supply by about 2.5 percent. The nitrogen supply for fertilizer use will be about 2,350,000 tons, representing an increase of about 4.4. percent over '54-55.

The 1955-56 supply of available phosphoric oxide is forecast at 2,300,000 tons, or approximately the same quantity delivered in 1954-55.

The supply of potash available for fertilizer use in terms of potasium oxide is estimated at 1,940,000 tons, representing an increase of 4.3 per cent.

A. L. Mehring, fertilizer staff specialist, and C. Graham, administrative assistant, food and materials division, emphasize that the estimates are not based on capacity of industry, but on current rates of production, trends in usage and foreign trade.

Deliveries of nutrients to the fertilizer manufacturing industry during the 1954-55 season, totaled 6,247,000 tons as compared with 6,215,000 tons in 1954-55.

•

Miss. Insect Control Conf.

The second annual Mississippi Insect Control Conference will be held at Mississippi State College, January 5-6, according to A. G. Bennett, extension entomologist at Mississippi State College.

The conference will be highlighted by a panel discussion of the new "Miller Law" as it applies to tolerances for insecticide residues on vegetables and other food crops.

The seeming build-up of resistance to insecticides by many harmful insects will be discussed.

Highlights of Mississippi research on insect control will be another feature attraction to formulators, insecticide dealers and practicing entomologists attending the conference.

Executive Committee of N. E. Weed Control Conference

(Seated, l. to r.) C. L. Hovey, program chairman; John Van Geluwe, president of conference; R. H. Beatty, president of national association; R. J. Aldrich, secretary; (standing l. to r.) E. M. Rahn, publicity chairman; Dale Wolf, membership chairman; D. A. Schallock, treasurer; R. A. Peters, coordinator.

Those in attendance will also hear a nationally known authority discuss the latest developments in the use of systemics in cotton insect control and livestock parasite control, Mr. Bennett stated. The noted researcher is K. P. Ewing, in charge, Cotton Research Branch, Research Division, U. S. Department of Agriculture, Beltsville, Md.

The Mississippi Entomological Society will also hold its annual meeting in connection with the conference, at which time officers for the coming year will be selected.

•

Rutgers Farm Courses

Sixty-one persons from all parts of New Jersey and from Pennsylvania, New York, Ohio and Canada enrolled for Rutgers University's 50th session of short courses in agriculture.

Ten-week courses, beginning October 12th are being given in dairy farming, fruit growing, vegetable production, animal husbandry, poultry husbandry, turf management and landscape maintenance.

•

APS Meeting in Atlanta

The 47th annual meeting of the American Phytopathological Society in conjunction with the American Association for the Advancement of Science and Southern Division, APS, will be held December 27-30th at the Atlanta Biltmore Hotel, Altanta, Ga.

Julian H. Miller is chairman of the committee on local arrangements.

Discussion of the following topics is scheduled: Nature of Fungicidal Action; Genetics of the Fungi; Diseases of Forage Crops; Physiology of Diseased Plants; Smut Disease of Cereals and Grasses; Disease of Fruit Crops; Antibiotics and Seed Treatments; The Cotton Plant.

•

FDA Approves Tolerances

The Food and Drug Administration, in recent announcements, approved a tolerance for residues of a chemical pesticide on certain raw agricultural commodities and gave notice of the filing of application for tolerances for residues of certain other chemical pesticides as follows:—

Approval was given to a tolerance of one part per million for residues of 3-(p-chlorophenyl)-1, 1-dimethylurea on asparagus, cottonseed, onions (dry bulbs only), pineapple, spinach, and sugarcane.

Food Machinery & Chemical Corporation, Middleport, N. Y., filed a petition for a tolerance for residues of piperonyl butoxide (butyl carbityl) (6-propyl piperonyl) ether at twenty-seven parts per million and for residues of pyrethrins at 2.7 parts per million in or on corn, wheat, rice, popcorn, peanuts, beans, and peas.

Dow Chemical Company, Midland, Mich., filed a petition for a tolerance for residues resulting from the use of ethylene dibromide to fumigate soil ranging from five parts per million for lima beans, strawberries and sugar beets, to 100 parts per million for sugar beet tops, carrots, carrot tops and celery, and to 200 parts per million for cottonseed.

Syn. Nitrogen Pres. Resigns

Miguel Tegtmeyer has resigned as president of the Synthetic Nitrogen Products Corp., New York.

Mr. Tegtmeyer has long been associated with Synthetic Nitrogen. From assistant to the president in 1933 he became secretary, a director in 1937, vice-president in 1940, executive vice president in 1945 and president in 1954.

As executive vice president he helped increase the supply of Cal-Nitro and obtained for Synthetic the American distribution of West German potash. Mr. Tegtmeyer developed the widespread use of Cal-Nitro as a top-dresser.

•

Chipman Names Kerr

Chipman Chemical Co., Bound Brook, N. J., announced recently the appointment of Cecil F. Kerr as sales representative in Michigan, Indiana and western Ohio. Mr. Kerr will make his headquarters at Bay City, Michigan. He was formerly the farm and home development agent for Bay County, Michigan.

•

R&H Files Infringement Suit

A patent infringement suit was filed on September 26 by Rohm & Haas Co., Philadelphia, against Chemical Insecticide Corp. and United States Fungi, Inc., both of Brooklyn, New York, and Joseph Lamberta, distributor of agricultural chemicals and agent for the two companies in Smyrna, Delaware.

The suit, filed in the U. S. District Court at Wilmington, Delaware, charges infringement of U. S. Reissue Patent 23,742 under which the Rohm & Haas Company sells its "Dithane" brand fungicide.

The suit charges the three defendants with direct infringement, with actively inducing others to infringe, and with contributory infringement through its sale of salts of ethylene bisdithiocarbamic acid knowing they have no commercial use outside the patent claims.

This action follows the filing by the Rohm & Haas Company several months ago of infringement suits on the same patent against E-Z Flo Chemical Co., Lansing, Mich., and its affiliate, Diamond Fertilizer Co., Sandusky, Ohio, and also against Roberts Chemicals, Inc., Nitro, West Virginia.

•

Niagara Names Duckworth

Niagara Chemical Division of Food Machinery and Chemical Corp., New York, announced recently the appointment of George C. Duckworth to the position of southeastern manager, with headquarters at the Niagara office in Jacksonville, Fla.

Mr. Duckworth, prior to his move to Jacksonville, had been district sales manager in the Texas-Oklahoma area, with offices at Harlingen, Texas.

Mr. Duckworth has had wide experience with Niagara in various sales posts since joining the firm as a sales representative after his discharge as a flying officer in the Army during World War II.

•

Pitts Coke Advances Young

James W. Young has been appointed an assistant supervisor in the agricultural chemicals section of Pittsburgh Coke & Chemical Co.'s Neville Island, Pa. research department. Mr. Young joined the company's research and development department in 1948.

•

W. P. Gage Addresses Engnrs.

William P. Gage, W. R. Grace & Co., New York, told members of the American Institute of Chemical Engineers at its meeting at Lake Placid, N. Y., September 28th, that his company's recent extensive investment in the United States chemical industry is "part and parcel of Grace's belief in the profit tested policy of diversification."

He pointed out that by the end of 1954, about 55 percent of the net fixed assets of W. R. Grace & Co., were in chemicals, as contrasted with only 2½ percent in 1950. As an example of Grace's continued interest in the chemical industry, he cited a joint venture in Brazil with Farbwerke-Hoechst, where Grace is building a plant for the manufacture of DDT, caustic soda, chlorine, solvents derived from ethanol and textile auxiliaries.

Majure, Calspray District Mgr.

The appointment of Wallace J. Majure as district manager of the California Spray-Chemical Corp. was announced recently. From his office at Maumee, Ohio, Mr. Majure will supervise operations in the Great Lakes area.

He succeeds M. E. Wierenga, who has just been appointed manager, foreign sales department, at Calspray's home office in Richmond.

Mr. Majure has been with Calspray for seven years. Previous to his new appointment, he was the branch manager in Virginia.

•

Cotton Conf. Dec. 15-16

The first annual Beltwide Cotton Production Conference sponsored by the National Cotton Council will be held at the Peabody Hotel, Memphis, Tenn., Dec. 15-16. J. C. Hardin, president of the Arkansas Farm Bureau Federation will be general chairman at the opening session.

The following are among the addresses to be presented at the meeting:

"New Developments in Control of Major Cotton Diseases," panel discussion, moderated by J. T. Presley, USDA.

"Basic Approaches to Chemical Weed Control in Cotton," W. B. Ennis, USDA, Mississippi.

"Highlights of 1955 Research on Weed Control on Cotton," W. K. Porter, Jr., Louisiana Agricultural Experiment Station.

"A Practical Combination of Weed Control Practices in Cotton Production," C. G. McWhorter, USDA, and O. B. Wooten, USDA, Stoneville, Miss.

"New Developments in Systemic Insecticides" C. F. Rainwater, USDA, Beltsville, Md.

"Important Developments in Non-Systemic New Insecticides," F. S. Arant, Alabama Polytechnic Institute, Auburn.

"Recent Developments Regarding Pink Bollworm," S. E. Jones, Brownsville, Tex.

Major Problems and Recommendations in Controlling Cotton Insects," panel discussion, H. G. Jonston, National Cotton Council, moderator.

•

Sammons, Rotary Governor

Thomas B. Sammons, Jr., president of Hayes-Sammons Co., manufacturers of insecticides, Mission, Texas, is serving as a district governor of Rotary International, worldwide service club organization, for the fiscal year of 1955-56.

Pesticide emulsion problems?

THIS MAN COULD BE ON HIS WAY TO SEE YOU WITH THE ANSWERS

He's one of Armour's staff of emulsion specialists. His job is to help you find *specific* emulsifiers that satisfy *your* requirements for stability and "flash" dispersion. The skill and experience of Armour specialists are available to you at all times. We will select and send you a group of Armour emulsifiers best suited for your testing if you fill in the coupon below. Or, if any of your insecticide or herbicide formulation problems require special laboratory work, an Armour emulsion specialist will travel to your plant and work right along with you.

In the laboratory, Armour specialists develop both non-ionic and cationic emulsifiers. Armour cationic emulsifiers are generally insensitive to varying water hardness. Their herbicidal concentrates are clear and soluble at *any* dilution with fuel or diesel oil. They will emulsify the most potent toxicants at concentrations as low as 2%! That is why less of an Armour cationic emulsifier is required to do the job. Exact specifications insure their uniform, dependable performance.

Under actual field conditions, Armour emulsifiers give immediate dispersions and rapid spreading with minimum runoff and loss. Only after passing the strictest tests and receiving industry acceptance are emulsifiers added to the Armour line. Armour emulsifiers are versatile—one may serve many different formulations. This reduces inventories and simplifies processing. The coupon will bring you further information and samples of outstanding Armour emulsifiers.

FILL IN AND MAIL THIS COUPON TODAY!

Formulation requirements:

Type toxicants used.....

Type solvent used.....

Lbs. Toxicant/gal. of concentrate.....

Water hardness range:.....ppm.

Emulsion stability required.....

Please send me:

☐ Samples ☐ Information

☐ Have technical representative call

Name.....Title.....

Firm.....

Address.....

City.....Zone....State.....

A11

ARMOUR CHEMICAL DIVISION

© Market Development Department
1355 W. 31st St. Chicago 9, Ill.

Washington Fertilizer Plant

Plans to build a $20 million fertilizer plant in Pasco, Washington in 1956 were announced recently by Pacific Northwest Pipeline Corp. and the Phillips Pacific Chemical Co. The plant will have a capacity of 200 tons of anhydrous ammonia a day.

•

11 New Systox Registrations

Federal registrations for "Systox," produced by Chemagro Corp., New York, now comprise application to the following crops: apples, broccoli, brussels sprouts, cabbage, cauliflower, cotton, muskmelons, nonbearing fruits, oranges, ornamentals, pears, potatoes, seed alfalfa, strawberries, and walnuts.

The above is a complete list, including previous acceptances. The new food crops usages result from eleven new official tolerances established and published in the September 2nd issue of the *Federal Register*.

Aldrin
Aramite
BHC DDT DDD
Captan
Chlordane
Dieldrin
Endrin
Heptachlor
Lead Arsenate
Lindane
Malathion
Methoxychlor
Ovex
Parathion
Sulphenone
Sulphurs
Systox
TEPP
Toxaphene

Seed Protectants
Herbicides
Soil Fumigants
Grain Fumigants
Defoliants
Cattle Sprays
Cotton Dusts
and other
Agricultural Chemicals

Stauffer CHEMICALS SINCE 1885

Q. What do formulators and manufacturers require?

A. *Dependable* chemicals in *continuous* supply!

STAUFFER'S wide range of technical and formulated agricultural chemicals . . .

. . . coupled with *long* experience in *working with* manufacturers, formulators, packers, and growers . . .

. . . means that STAUFFER can do a job for *you!*

Stauffer Chemical Company
380 Madison Avenue, New York 17, N. Y.
Sales Offices in Principal Cities

STAUFFER Stauffer CHEMICALS **CHEMICALS**

Insecticide-Fungicide Aerosol

A new aerosol product for the home gardener which applies insecticide spray and fungicide dust on roses in one operation was shown for the first time by the Du Pont Company at the National Hardware Show in Chicago, October 17.

This is the first known garden aerosol with the "wet and dry" combination. It is also the first to offer mildew control along with the control of major insects and diseases that attack roses.

In addition, the light-colored fungicidal dust serves as a visible tracer to indicate where the material has been applied. Called a "Spray-Duster," the aerosol contains an insecticidal mixture including methoxychlor, lindane and rotenone. The fungicide mixture combines zineb with dinitro (1-methylheptyl) phenyl crotonate.

•

Entomology Cong. in Canada

The 10th International Congress of Entomology is scheduled for August 17-25, 1956, at McGill University and the University of Montreal, Montreal, Canada. The congress will be divided in 16 sections, of which six: agricultural entomology, forest entomology, medical and veterinary entomology, stored products entomology, biological control and apiculture are directly concerned with the practical and economic aspects. More details on the Congress will be available early in 1956.

•

Sulfenone Assigned to Stauffer

The term "Sulfenone" was recently purchased by Stauffer Chemical Co., New York, from Lester W. Hanna, Forest Grove, Ore. Stauffer recently named its product R-242 as "Sulphenone."

•

Canadian Potash Deposits

Potash Co. of America and Western Potash Co., a Canadian firm, have underway shaft sinking programs to mine potash deposits in Canada. The Potash Co. is working deposits near Patience Lake, east of Saskatoon, the Canadian company is sinking shafts near Unity, which is west of Saskatoon.

Weed Soc. of America, Jan. 6

The charter meeting of the Weed Society of America will be held January 4-5 at the Hotel New Yorker, New York City, while the Northeastern Weed Control Conference is scheduled for January 6th. The theme of the opening session of the meeting will be "Modern Weed Control . . . A New Science." R. H. Beatty, president of the national society, and J. D. Van Geluwe, president of the NE conference will open the meeting on January 4th. W. B. Ennis, vice president of the Weed Society of America, will be chairman at the opening session.

The problems, progress, and organization of weed control in England and in Canada will be discussed, lending a universal flavor to a review of the herbicide market. Some of the technical questions concerning herbicidal action . . . and specific control problems of weeds in agronomic crops, horticultural crops, non-cultivated crops, turf, etc., are also to be reviewed at the meeting. Industrial views of modern weed control will be outlined by M. T. Goebel, E. I. du Pont de Nemours & Co.

•

Correction on Bayer 17147

The October issue of *Agricultural Chemicals* referred to Bayer 17147 as a "systemic insecticide." We wish to correct this statement, as Bayer 17147 is not a systemic.

As previously reported, Chemagro Corp., New York, will manufacture the new material. However, US production will not be available for commercial distribution until 1957. Chemagro plans to import 1956 requirements from Farbenfabriken Bayer of Leverkusen, Germany, the originator of the product.

•

Des Moines Sludge for Fert.

Pioneer Phosphate Co., Des Moines, Ia., recently took over operation of a fertilizer plant using sludge from the city sewage treatment plant. Pioneer has moved in machinery and new equipment for fertilizer manufacture and indicated that it expects to have a profitable operation.

The plant has an "off-again-on-again" history since it was erected in 1946, under a contract between the city and the Soiltone Co., Lincoln, Neb. The plant was built at a cost of about $45,000 but operated for only about a year. It was operated again under the name Fertilla Co. late in 1950, and early '51.

A new name for the plant product is being considered by the Pioneer Phosphate Co.

•

McGrane Joins Am. Potash

American Potash & Chemical Corp. announces that Frank McGrane has joined the company's general sales department. He will operate out of the main office at Los Angeles on special assignments. McGrane formerly was Southern California district sales manager for the agricultural chemicals department of American Cyanamid Co.

•

Du Pont Sales Force

Two men have been added to the Du Pont garden chemicals sales force. James E. Sutcliffe, of Norristown, Pa., has been assigned to the Baltimore-Washington area, and George E. Miner, of Lancaster, Ohio, has been assigned to western New York. Mr. Sutcliffe is a graduate of the National Agricultural College, with a degree in horticulture. Mr. Miner was graduated from Wooster College in Wooster, Ohio.

•

Simplot Buys Platt

The purchase of the Platt Valley Fertilizer Co., plant at Scottsbluff, Nebraska, has just been announced by the J. R. Simplot Co., an Idaho corporation.

W. Grant Kilbourne, vice-president of the Simplot Co., and general manager of the fertilizer division, announced today that the Scottsbluff operation of Curry Chemical division of Phillips Petroleum Co., has been purchased by Simplot in a transaction consumated at Boise, Idaho, the general offices of the Idaho company.

Mr. Kilbourne asserted that the policies and personnel of the Platt Valley Fertilizer Co., will remain intact under the new management. A Simplot manager, C. E. Brissenden, will take over the operation, however.

Mathieson Names Hansen

Lee R. Hansen has been named sales supervisor of the Pacific Northwest area for the western fertilizer division of Olin Mathieson Chemical Corp. Mr. Hansen will have his headquarters in Portland, Oregon, and will be responsible for sales of Ammo-Phos fertilizers, agricultural chemicals, grain fumigants, sprinkler irrigation systems, and new products for the western fertilizer division in Oregon, Washington and Idaho.

Prior to joining Olin Mathieson, Mr. Hansen was assistant professor of agronomy at Oregon State College, assistant division sales manager for Pacific Coast Borax Co. and manager of the agricultural chemical department for L. H. Butcher Co., Portland.

•

New Brea Plant in Prod.

The Brea Chemicals, Inc., plant at Brea, Calif., is in production. The plant is designed to produce 150 tons of ammonium nitrate in prilled form every 24 hours.

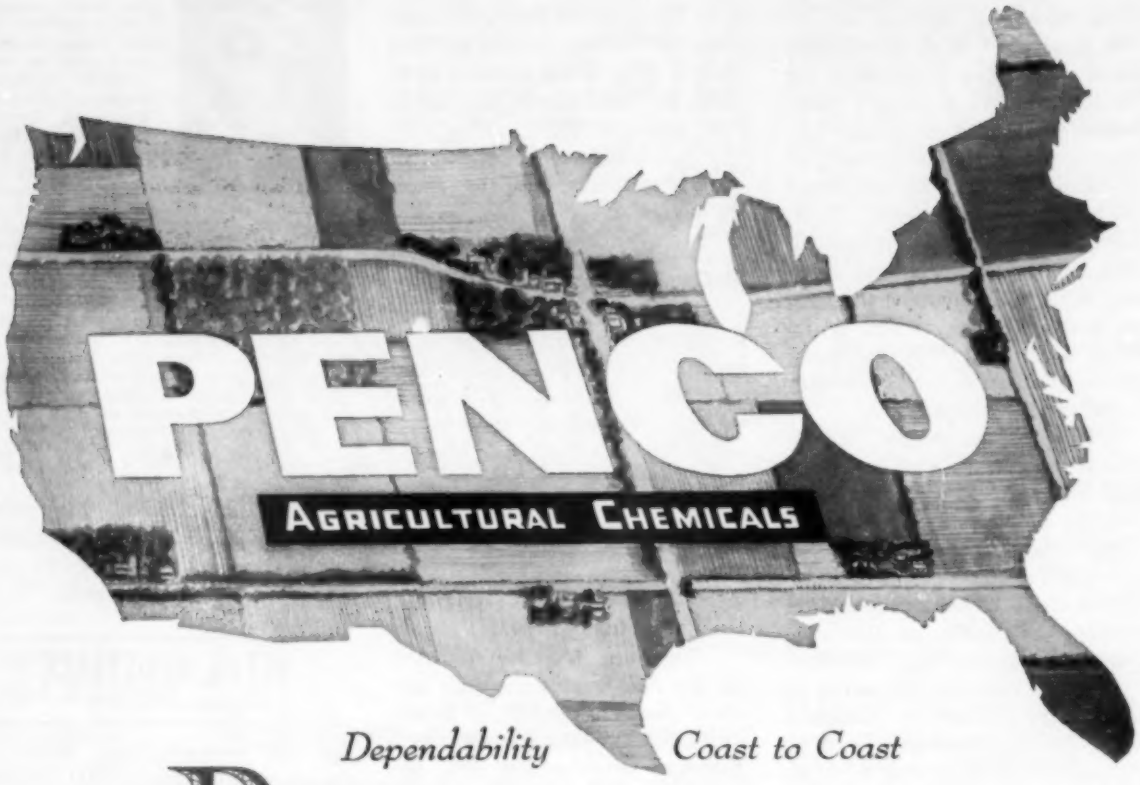
WEEVIL RESISTANCE

(From Page 65)

La., and Stoneville, Miss., talked at length with Messrs. R. C. Gaines, Merkl, Newsom, Roussel and other professional entomologists. Included are visits to experimental plots and to farms. I have examined the laboratory data of Roussel, et al.

"It is my judgment that boll weevils in large areas of Louisiana and Mississippi exhibit a considerable degree of resistance to chlorinated hydro carbon insecticides."

It is believed that recommendations for the 1956 season even in the State of Louisiana will still call for use of the chlorinated hydrocarbons except in the specific areas where difficulty was obtained in control this past season. In these particularly troublesome areas, calcium arsenate will probably be the recommended material. However, it is pointed out that when calcium arsenate is used, a build-up of aphis populations can be anticipated and calcium arsenate will fail to give control of leaf-hoppers, boll worm and other cotton pests. There is the further disadvantage that arsenic will accumulate in the soil and drift of insecticides would be damaging to soybeans, etc.



Dependability Coast to Coast

PENCO sprays help protect the fruit crops and the forests of the great Northwest. In Maine and Idaho, better potatoes grow with the aid of Penco potato insecticides. From California to the Carolinas, cotton quality is improved by use of Penco cotton insecticides and defoliants. In the Middle West, Penco herbicides help produce weed-free crops, and livestock producers depend on Penco dips and sprays. In short, you'll find Penco products practically everywhere.

PENNSYLVANIA SALT MANUFACTURING COMPANY OF WASHINGTON

TACOMA 1, WASH.

Pennsalt Chemicals

Aurora, Ill.; Philadelphia, Penn.; Berkeley, Los Angeles, Calif.; Montgomery, Ala.; Bryan, Texas; Portland, Ore.; Yakima, Wenatchee, Washington

Farmers of 17 States Appraise TVA Fertilizers

TVA announces the results of an appraisal of three of its fertilizer materials by more than 2,100 farmers in 17 states. The critical appraisals came from farmers participating in the test-demonstration program which is jointly sponsored by TVA and the various state extension services.

The three materials on which the farmers were asked for opinions were fused tricalcium phosphate, containing 27 percent plant nutrient; calcium metaphosphate, a 61 percent concentrate; and ammonium nitrate, a 33 percent material. They were asked to judge crop response, spreading characteristics, storage characteristics and other qualities.

The topography of the farms represented in the survey varied from plains to mountains, and the climate varied from the high rainfall of the southern Appalachians and the Pacific coast of Washington, to the very low rainfall of the Great Plains. The fertilizers were used on row crops, such as cotton and corn, on small grains, rotation pastures, and permanent pastures.

From 88 to 99 percent of those responding reported good to fair crop response with all three types of fertilizer when used on small grain, grass, annual legumes, perennial legumes, and grass and legume mixtures. From 1 to 12 percent reported poor results. On row crops, good to fair results were reported by 89 percent of the users of fused tricalcium phosphate, 94 percent of users of ammonium nitrate, and 73 percent of the users of calcium metaphosphate. Remaining farmers reported poor results.

All poor crop response was attributed by the farmers to the drought.

In judging crop response, the farmers reported "good" results most frequently with ammonium nitrate on small grains; with fused tricalcium phosphate on perennial legumes; and with calcium metaphosphate on grass and legume mixtures. They reported "poor" responses most often with ammonium nitrate and with calcium metaphosphate in non-Valley counties on row crops.

In giving their likes and dislikes, the farmers favored most often the high analysis of calcium metaphosphate, and the quick response of growth to ammonium nitrate. Of their dislikes, rusting caused by ammonium nitrate was most frequently mentioned.

Regarding storage characteristics of the three materials:

98.6 percent of 835 farmers rated fused tricalcium phosphate satisfactory; 1.4 percent said the bags tore. 85.8 percent of 800 said ammonium nitrate was satisfactory; 12.7 percent said the material "set up," or hardened; 1.5 percent said the bags tore. 90.5 percent of 452 farmers considered calcium metaphosphate satisfactory; 5.5 percent said the material "set up;" 4 percent said the bags tore.

Regarding the spreading characteristics of the materials:

79 percent of 835 farmers responding said fused tricalcium phosphate was satisfactory; 21 percent listed various complaints, such as flowing too freely, dusty, etc. 80 percent of 800 farmers said that ammonium nitrate was satisfactory; 20 percent objected to certain features. 76 percent of 452 farmers said calcium metaphosphate spreading characteristics were satisfactory; 24 said they had objections.

TVA said its principal interest in making the appraisal was to obtain first hand farmer reactions to the value of the fertilizer materials as a guide in TVA efforts to improve them.

•

Endrin Supply Increase

Endrin supplies were substantially increased when additional manufacturing facilities were completed recently, F. W. Hatch, manager of the agricultural chemicals division of Shell Chemical Corp., announced.

Endrin, a stereoisomer of dieldrin, has been used extensively for the control of cotton and tobacco insects since its introduction two years ago. Endrin, a versatile insecticide, has also shown outstanding results in controlling insects affecting sugar beets and cabbage seedlings. Manufacturing facilities are located at Shell Chemical's Denver plant.

NYS Insect-Fung. Conf. Nov. 8

THE 7th annual meeting of the New York State Insecticide Fungicide Conference, and the eighth annual Pesticide Application Equipment Conference will be held November 8-10, 1955 at Cornell University, Ithaca, N. Y. Dr. Charles Palm, will open the meeting, which is scheduled for sessions at Bibbins Hall, G.L.F. Terrace Hill.

The following subjects will be discussed at the meeting:

NOVEMBER 8—

The Relationship between Industry and the Land-Grant Colleges. Dean W. I. Myers, NYS College of Agriculture.

Insect Control on Onions and Carrots. W. A. Rawlins, Ithaca.

Long Island Vegetable Insect Problems. M. Semel, Riverhead.

Cabbage Insect Control. G. E. R. Hervey, Geneva.

Cabbage Maggot Control. A. C. Davis, Geneva.

Corn Insect Problems in the Hudson Valley. J. A. Adams, Poughkeepsie.

Recommendations for Vegetable and Potato Insect Control for 1956. Dr. R. R. Kriner, Ithaca.

Fungicides for Control of Downy Mildew on Broccoli. Dr. J. J. Natti and G. E. R. Hervey, Geneva.

Seed Treatment. F. L. McEwen, J. J. Natti, and W. T. Schroeder, Geneva.

Tomato Fungicides. W. T. Schroder, Geneva.

Glycerol-Streptomycin Sulfate Sprays for Control of Halo Blight of Beans. Fungicide Trials on Carrots and Parsnips. G. Silber, Ithaca.

Results of Fungicide Tests on Cucumbers and Onions. R. C. Cetas, Riverhead.

Fungicide Tests on Muckland Crops. P. H. Cocklin and G. O. Lewis, Ithaca.

Terraclor for Clubroot Control. R. C. Cetas, Riverhead.

Control of Rootknot Nematode on the Muck. A. F. Sherf, Ithaca.

Effectiveness of Vapam and Nemagon Against the Golden Nematode. M. B. Harrison, Ithaca.

Vegetable Disease Control Recommendations for 1956. A. F. Sherf, Ithaca.

Control of Smuts on Small Grains and Brome Grass. W. F. Crosier, Geneva.

Potato Disease Control and Recommendations for 1956. R. S. Dickey, Ithaca.

NOVEMBER 9—

Housefly Control in Dairy Barns. J. D. Sells, Ithaca.

Discussion of Cattle Mange, Fly Repellents and Livestock Insect Control Recommendations. H. H. Schwardt, Ithaca.

Need for Fungicides for Ringworm Control on Cattle. D. E. Baker, NYS College of Veterinary Medicine, Ithaca.

Air Application of Granulated Insecticides for European Chafer Control in Meadows and Pastures. W. G. Evans, Ithaca.

Preliminary Investigations of Several Insecticides for the Control of Insects of Birdsfoot Trefoil Seed. H. H. Neunzig, Ithaca.

A Study of the Systematic Action of Lindane upon Several Forage Crop Insects. C. S. Koehler, Ithaca.

Control of Florist Crop Diseases. C. G. Lindberg and J. P. Ross, Ithaca.

Control of Mites and Insects on Florist Crops. J. A. Naegele, D. Watson and E. Karlin, Ithaca.

Results of Nursery Pest Control on Long Island. R. E. Freece, Ithaca.

Wooly Apple Aphid Control. Carl O. Hansen and F. L. Gambrell, Geneva.

Control of European Chafer in Nurseries and Ornamental Turf. F. L. Gambrell and G. L. Mack, Geneva.

Trends in Basic and Applied Research in the Organic Phosphate Field. Rosmarie von Rumker, Chemagro Corp., New York City.

Responsibility of Industry Under the Miller Amendment. R. H. Wellman, Carbide and Carbon Chemical Corp., New York City.

Experience with Fungicides on Fruit in 1955. M. Szkolnik, Geneva.

Fungicide Tests for the Control of Apple Mildew. J. M. Hamilton, Geneva.

Report of the 1955 Fruit Disease Work in the Hudson Valley. D. H. Palmiter, Poughkeepsie.

Effect of Pesticides on Apple Yield and Quality at the Sprong Orchard. J. M. Hamilton, E. H. Glass, M. Szkolnik, and O. F. Curtis, Jr., Geneva.

Effect of Fungicides on the Yield of Young McIntosh, Cortland, and Golden Delicious Varieties of Apples. J. M. Hamilton and M. Szkolnik, Geneva.

Effect of Fungicides on the Yield of Montmorency Cherries. M. Szkolnik and J. M. Hamilton, Geneva.

Impressions of Apple Fungicides in 1955. A. B. Burrell, Ithaca.

Control of a Cherry Disease by Soil Fumigation with a Nematocide. W. F. Mai and K. G. Parker, Ithaca.

Fruit Disease Control Recommendations for 1956. W. D. Mills, Ithaca.

Fruit Disease and Insect Control Recommendations for Small Fruits in 1956. Paul H. Wooley, Ithaca.

November 10

Grape Berry Moth Control. E. F. Taschenberg, Fredonia.

Codling Moth, Red-banded Leafroller and Aphid Control on Apples. E. H. Glass, reported by P. J. Chapman, Geneva.

Acaracides and Cherry Insects. S. E. Lienk, Geneva.

Hudson Valley Insect Problems. Ralph Dean, Poughkeepsie.

Peach and Plum Insects. E. H. Smith, Geneva.

Fruit Insect Control Recommendations for 1956. A. A. LaPlante, Ithaca.

Chemical Thinning and Drop Control on Apples. M. B. Hoffman, Ithaca.

Developments in Application Equipment for Soil Pesticides. Merrill Adams, Shell Chemical Corp., Modesto, Calif.

Some Principles in the Application of Liquid Insecticides. A. W. A. Brown, University of Western Ontario, London, Ontario.

Report on Pump Performance Tests on Some of the Newer Piston-Type Pumps. W. Gunkel and E. D. Markwardt, Ithaca.

Potato Spraying with Airblast Equipment. Robert Partyka, Ithaca.

Is the Swing to Air-Blast Sprayers Reducing the Level of Control in Orchards? A. B. Burrell, Ithaca.

Research with Equipment for Mite Control on Beans and Worm Control on Cauliflower. M. Semel, Riverhead.

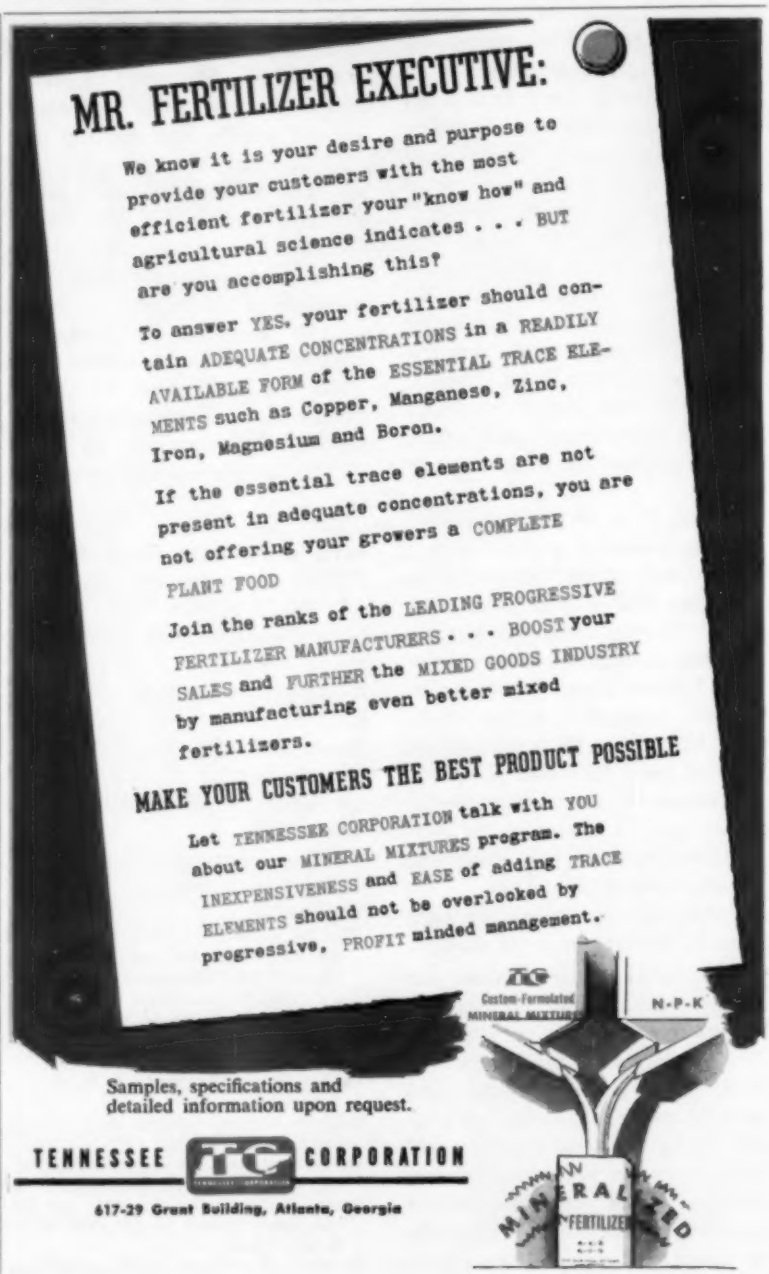
Further Work on Mist Concentrate Sprays for Row Crops. J. L. Brann, Jr. and W. W. Gunkel, Ithaca.

Mist Concentrate Spraying for Tomato Disease Control. W. T. Schroeder, Geneva, and W. W. Gunkel and J. L. Brann, Jr., Ithaca.

Spray Equipment in Relation to Grape Berry Moth Control. E. F. Taschenberg, Fredonia, and E. D. Markwardt, Ithaca.

Research with Pesticide Diluents. D. E. Weidhass, Ithaca.

A Review of Problems with Concentrate and Modified Concentrate Application Equipment for Disease and Insect Control, as Seen by the Extension Staff. A. A. LaPlante, W. D. Mills, R. R. Kriner and A. F. Sherf, Ithaca.


MR. FERTILIZER EXECUTIVE:
We know it is your desire and purpose to provide your customers with the most efficient fertilizer your "know how" and agricultural science indicates . . . BUT are you accomplishing this?
To answer YES, your fertilizer should contain ADEQUATE CONCENTRATIONS in a READILY AVAILABLE FORM of the ESSENTIAL TRACE ELEMENTS such as Copper, Manganese, Zinc, Iron, Magnesium and Boron.
If the essential trace elements are not present in adequate concentrations, you are not offering your growers a COMPLETE PLANT FOOD
Join the ranks of the LEADING PROGRESSIVE FERTILIZER MANUFACTURERS . . . BOOST your SALES and FURTHER the MIXED GOODS INDUSTRY by manufacturing even better mixed fertilizers.
MAKE YOUR CUSTOMERS THE BEST PRODUCT POSSIBLE
Let TENNESSEE CORPORATION talk with YOU about our MINERAL MIXTURES program. The INEXPENSIVENESS and EASE of adding TRACE ELEMENTS should not be overlooked by progressive, PROFIT minded management.
Custom-Formulated MINERAL MIXTURES
N-P-K
MINERALIZED FERTILIZER
Samples, specifications and detailed information upon request.
TENNESSEE TC CORPORATION
617-29 Grant Building, Atlanta, Georgia

Western Agricultural Chemicals Association Elects A. Kirkpatrick Pres.; H. Bales as V.P.

By Charles Starker

ORGANIZATIONAL business, the annual election of directors and officers, and invitational talks on salesmanship and product development highlighted the annual meeting of the Western Agricultural Chemicals Association, held October 11, at the Hotel Claremont, Berkeley, California.

New officers for the 1955-56 period are president, A. F. Kirkpatrick, American Cyanamid Co., Oakland; vice-president, Harvey M. Bales, Arizona Pest Control Co., Glendale, Ariz.; and executive secretary-treasurer, C. O. Barnard, San Jose, Calif. The following were elected by ballot to the board of directors for a 2-year term: Keith Sime, Chipman Chemical Co., Portland, Ore.; A. F. Kirkpatrick, American Cyanamid Co., Oakland, Calif; O. B. Hitchcock, Chemagro Corp., San Mateo, Calif; J. H. Neal, Hercules Powder Co., San Francisco; and Jack White, White Chemical Co., Phoenix, Ariz. Re-elected to a 2-year term were Ivor Burden, United Chemical and Heckathorn, Ltd., Richmond, Cal.; W. L. Piguet, Sunland Industries, Fresno; and E. J. Davis, Los Angeles Chemical Co., Los Angeles, Cal. Hold-over board members include Harvey M. Bales, Arizona Pest Control Co., Glendale, Ariz.; C. E. Cody, California Spray Chemical Co., Richmond, Cal.; F. C. Colbern, Coastal Chemical Co., Oxnard; D. W. Galbraith, Agriform Co., El Centro, Calif.; C. H. Starker, Pacific Supply Co-op, Portland, Ore.; C. H. York, Shell Chemical Corp., Los Angeles, and S. W. Strew, Chipman Chemical Company, Palo Alto, California.

Retiring president Stanley W. Strew outlined some of the high lights of association activities during the past season. He mentioned the agressive action taken by the legislative committee in regard to the proposed permit system of the California Department of Agriculture code relating to use of herbicides and pesticides, as initially defined in the act. As originally stated, this would have made Industry a policeman.

Executive secretary - treasurer, C. O. Barnard reported on a recent hearing in Sacramento, relative to pesticide storage regulations. This proposed regulation was considered unworkable, and unrealistic. Testimony from three local industry representatives that the proposed regulations, as then presented, would put them out of business, convinced the hearing that the regulation should be tabled until WACA's technical committee could meet with the California Fire Chiefs' Association and work out with them feasible regulations for pesticide storage.

Legislative committee chairman, A. F. Kirkpatrick, stressed in his report the excellent cooperation he had enjoyed from his committee members during a year in which there was plenty of legislative activity of interest to the industry. A careful watch was kept in western states on proposed legislation affecting industry, and its position made known when necessary at hearings held for that purpose. Close liaison was maintained with personnel of the state departments of Chemistry and Agriculture.

(1) Dr. Rosmarie von Rümker, Chemagro, N. Y., Dr. Leo Gardner, California Spray Chem. Corp., Richmond.
(2) Henry Moras, Stauffer Chemical Co., S. F., B. Bashor, Shell Chemical Co., S. F., W. E. Ball, Stauffer Chemical Co., S. F.
(3) Edw. H. Littooy, Colloidal Prod., S. F., L. S. Madsen, Western Fertilizer Div., Olin Mathieson Chem. Corp., Phoenix, Ariz.
(4) Al Swain, Eston Chem. Div., American Potash & Chemical Corp., L. A., R. H. Bahme, Pacific Guano Co., Berkeley.

(5) **New Officers of the Association:** H. M. Bales, Arizona Pest Control Company, Glendale, Ariz., Vice-President; C. O. Barnard, Executive Secretary-Treasurer, San Jose, Calif.; A. F. Kirkpatrick, President, American Cyanamid Company, Oakland, Calif.

(6) Dave Scott, Soilserv, Salinas, Calif., T. G. Lewton, Jr., Pittsburgh Coke & Chem. Co., San Francisco.

Sales and Salesmanship

"NOTHING happens until the sale is made. Good salesmanship bridges the gap between a pesticide product and its public acceptance" Mr. E. D. Maloney, vice-president and general manager, Northern California Area, Pacific Telephone and Telegraph Co., told the group. "Professional salesmen and sales managers provide the motivation needed for tangible results. The best product in the world will stagnate on a manufacturers' shelf unless the salesman moves it off."

Mr. Maloney traced the different sales techniques used from the early "Yankee Traders" down through the "free and easy days" of our early territorial expansion, to the present day when every item sold has an appealing package, styled for consumer appeal and glamourized with well-known brand names. This intense competition aids sales opportunities, and also increases the problems of the salesman. A salesman today has to sell and instruct without seeming to do so, and to perform this service without creating an obligation—help the customer decide what he wants, and then show him how to get." He described Hercules Powder Co., development of Toxaphene sales. "Here was a product," he said, "released when DDT was a wellknown farm and household word." The Hercules program was well managed, complete with educational films, slides, sales teams and promotional kits. Hercules representatives were moved into infested areas, and then acted in accordance with a well-defined sales program utilizing spot radio and newspaper ads and other sales helps. As a result their sales climbed from nothing to millions of dollars per year—due partly to good salesmanship."

Basic and Applied Research

"BASIC Research is far behind Applied Research," Dr. Rosmarie von Rümker, director of Research, Chemagro Corp., New York, stated in an address to WACA members. "Trial and error biological testing has been the source of most 'new' pesticide compounds. DDT and BHC, while long known chemically, have only in fairly recent years had their pesticidal activity clarified. In today's rapidly developing pesticidal field, trial and error methods are inadequate for present problems, such as the rapid development of biological resistance of insects and mites and the disturbance of the natural balance of insects by insecticides.

"Organic phosphates can be formulated as 'tailor-made' chemicals, suited for the job needed, with a minimum amount of side-action. Their biological activity is better known and the gaps between basic and applied research are less than with conventional materials." Dr. von Rümker concluded by stating that basic knowledge is important for the proper use of pesticides in day to day problems. (The complete text of Dr. Von Rümker's address will appear in the December issue of *Agricultural Chemicals*.)

Responsibilities of Salesmen

IN a discussion of the pesticide salesman, Robert Z. Rollins, Asst. Chief, Bureau of Chemistry, California Department of Agriculture advised that, "While misrepresentation has often been charged against pesticide salesmen, this has seldom actually been the case. Misunderstanding is generally the rule. Certainly, the salesman can frequently be charged with failure to do a full job—he may not have informed the purchaser of the precautions of handling or using the material; use of respirator; danger of skin contamination; or the need for a permit; possibility of flavor alteration to later crops; improper disposal of containers; incompatibility with other materials the grower might use and the seriousness of residues from late season applications." Excessive residues caused by late applications do not allow the producer to market his crop, and thus actually do him a great disservice.

"With the provisions of the Miller Bill regulations affecting us all, farmers will be forced to develop more complete pest control programs and not use the 'hit or miss' schedules formerly employed by many. A close watch will need to be kept on crops so that pest populations will be known and proper pesticides may be selected when needed—taking into consideration the possibility of flavor alteration, predators, effect on neighboring crops, and animals, including honeybees.

"While the salesman should not be expected to be a specialist in everything, he should do his best to see that the pesticide is used how, when and where it should be used . . . and not too often, too late, or in excessive amounts."

•

New Allied Sales Offices

Two new sales offices for agriculturaltural products have been opened by the Nitrogen Division of Allied Chemical & Dye Corp. One is at Kalamazoo, Mich., and the other at Columbia, Mo.

The Kalamazoo office, located at 511 East Paterson St., is shared with Allied's General Chemical Division. The Columbia office is located at 20A South 9th St. Nitrogen Division's Los Angeles office, which was opened a year ago, has been consolidated with the General Chemical Division Los Angeles office and moved to 2999 West 6th St.

•

Carbide Ofc. in New Orleans

A new sales office in New Orleans, Louisiana, has been opened by Carbide and Carbon Chemicals Co., a Division of Union Carbide and Carbon Corp.

•

Coleman Guest at CFA

An address on National Plant Food Institute Activities by Dr. Russell Coleman, executive vice president NPFI, will be featured at the annual meeting of the California Fertilizer Association Nov. 6-9, at the Hotel Mark Hopkins, San Francisco. Another highlight of the 3-day session will be the presentation of the "Man-of-the-Year" Award.

J. Earl Coke, Bank of America, San Francisco, will address the group on the subject of "Using advance practices as a means of maintaining a sound agriculture." Active participation is expected in a panel discussion on "The importance of soil fertility and plant nutrition in sound marketing of fertilizer materials."

NOW, DIRECT FROM US, PESTMASTER*DDT Technical for your dusts, wettable powders, solutions, and emulsions. This leading brand of 100% DDT is hard, clean, stable. Its use will add kill, stability and uniformity to your formulations. Phone, write or fill in the coupon below for prices, conditions and samples.

Users or exporters of 75% DDT Wettable powder should investigate our PESTMASTER* Brand. Review its resistance to tropical conditions, its uniform wettable and suspension properties, its carefully controlled packaging which preserves its qualities. Remember, PESTMASTER* 75% DDT Wettable does the job when it gets on the job — Asia, Africa, South America, Europe, here at home—wherever you want it. Write for prices, conditions, samples. Use the coupon.

Send a sample of PESTMASTER* DDT Technical Grade (100%) ☐ Prices ☐
Send a sample of PESTMASTER* 75% Wettable ☐ Prices ☐

Name .....

Company or Government Agency .....

City ..... State ..... Country .....

MC** ®

MICHIGAN CHEMICAL CORPORATION
501 N. Bankson Street, Saint Louis, Michigan
EASTERN SALES OFFICE
230 Park Avenue
New York 17, New York

*REG. U.S. PAT. OFF. **T.M.

D-55-1

QUALITY PRODUCER OF PESTMASTER* DDT & METHYL BROMIDE AND OTHER AGRICULTURAL CHEMICALS

FOR BULK OR SMALL PACKAGE LINES . . .

there's a matched ATLOX® emulsifier

Is your concentrate sold in small packages—or do you pack in bulk? It makes a lot of difference in your choice of emulsifier. For small packages, the emulsifier should retain the light, clear appearance of the concentrate, and should provide exceptionally long shelf life and flexibility of use. Bulk-packaging needs a "workhorse" emulsifier that gives reasonable shelf life and economy.

No matter what type of packaging you use, a matched Atlox emulsifier will keep your concentrate in top condition from the time you formulate it in your plant until it's mixed for spraying.

Packaging is only one of the vital points to consider in choosing an emulsifier for your specific toxicant concentrate. If you'll give us the data outlined in the check list below, we'll be glad to recommend an Atlox emulsifier or blend that matches your formula in every respect.

EMULSION DATA CHECK LIST

1. Toxicant used_____
2. Solvent used_____
3. For water hardness_____ ppm.
4. Recommended dilution_____
5. Lbs. toxicant/gal. of concentrate_____
6. Desired emulsion stability_____
7. Shelf life period expected_____
8. Ease of dispersion important?_____
9. Packaging: bulk_____ or small container_____
10. How is concentrate mixed and evaluated in laboratory tests?_____

CHEMICALS DIVISION
ATLAS POWDER COMPANY
WILMINGTON 99, DELAWARE

offices in principal cities

ATLAS POWDER COMPANY, CANADA, LTD.
BRANTFORD, CANADA

Canadian Firms Merge

Amalgamation of the pesticides operations of Canadian Industries (1954) Ltd. and Chipman Chemicals Ltd., manufacturers of pesticides in eastern and western Canada, respectively, will take place within the next few months.

Fifty per cent of the shares in a joint company, to be known as Chipman Ltd., will be held by CIL and 50 per cent by Chipman.

Head office of the new company will be in Montreal. It will have four plants located at Buckingham, Que., Hamilton, Ont., Winnipeg, Man., and Moose Jaw, Sask. Sales and technical services will be handled from offices located at suitable centres across the country. Operations of the new company will also include custom spraying of railroad beds and rights-of-way.

•

Spencer Award to Hixon

Ralph M. Hixon, of Iowa State College, Ames, Iowa, was recently named the first winner of the Charles F. Spencer Award in agricultural and food chemistry. The prize, which consists of $500 and a gold medal, will be presented to Dr. Hixon at the annual fall conference of the American Chemical Society's Kansas City Section, in Kansas City, Mo., on November 11.

The new award was founded by Kenneth A. Spencer, president of the Spencer Chemical Co., Kansas City, in memory of his father, Charles F. Spencer. The Spencer Award is given annually to a United States citizen who has made "meritorious contributions to the field of agricultural and food chemistry" in the United States.

•

IMCC Strike Settled

Negotiations were completed early in October for the settlement of a four-month-old Florida phosphate strike by the International Chemical Workers Union, Local 35 against International Minerals & Chemical Corp.

The contracts were settled on the basis of previous agreements without loss of management functions for efficient operation of the business which the union sought to alter.

Terms included a four-year contract with International's phosphate minerals employees and a two-year contract with the company's phosphate chemicals employees.

•

Calspray Names Wierenga

The appointment of Melvin E. Wierenga as manager of the new foreign sales department of the California Spray-Chemical Corp., Richmond, Calif., was announced recently.

The new Foreign Sales Department will be Calspray's fifth operating department. Calspray subsidiaries in Mexico, Insecticidas Ortho, S. A.; France, California Spray-Chemical Compagnie Francaise, S.A.R.L.; and Canada, Ortho Agricultural Chemicals Limited; as well as Calspray's own operations in foreign markets will be supervised by Mr. Wierenga. Richard B. Auer, previously manager of Calspray's smaller foreign sales division under the marketing department, has been advanced to manager, Western Hemisphere-Orient Division, foreign sales department.

•

Hercules Info Center

Hercules Powder Co., Wilmington, Del., announced last month that it will build a new technical information center at its Experiment Station, Lancaster Pike, to cost approximately $1,000,000. A three-floor air conditioned building designed for the center will include 35,000 square feet of floor space. Completion is scheduled for October, 1956.

•

Iowa Co. Installs NH_3 Unit

A contract has just been let by the Continental Fertilizer Co., Nevada, Iowa, for the installation of a complete and continuous automatic-control neutral solution fertilizer plant. The contract was awarded to the J. C. Carlile Corp., Denver, for a plant to produce from 10 to 15 tons per hour of ammonium phosphate or complete liquid formulated fertilizers. Incorporated in the plant is a special Carlile unit for conversion of anhydrous ammonia to a neutral aqueous ammonia solution at an efficiency of 99%+. Similar Carlile converters are in operation as far away as Nicaro, Cuba.

NJ Pesticide Dealers to Meet

The New Jersey Pesticide Dealers conference has been announced for November 16th, to be held at the University Commons, Rutgers University, New Brunswick, N. J. Featured at this meeting will be a preview of new recommendations for 1956, and reports on 1955 research

•

Grace Earnings Up 29%

W. R. Grace & Co. reported a 29 percent increase in net earnings for the first six months of 1955, over the corresponding period for 1954.

The Davison Chemical Co. Division also reported somewhat higher earnings. Increased sales of this Division's triple superphosphates and certain industrial chemicals were reported to offset the general weakness in the demand for mixed fertilizer products. The Grace Chemical Co. Division made its initial contribution to sales and earnings this year. Last year the Grace plant was under construction, and pre-operating expenses were absorbed in 1954's net income.

•

Reduces Price Differential

Velsicol Chemical Corp., Chicago, has announced a reduction in the price differential between clarified grade technical Chlordane and agricultural grade technical Chlordane. As of October 1st, 1955, the price differential between the clarified grade and the agricultural grade was reduced six cents per pound. Formerly, the differential was ten cents a pound; now, it is four cents.

"This reduction on clarified Chlordane has been made possible by lower costs through increased production of this grade," according to John F. Kirk, vice-president in charge of sales.

•

Calspray W. Supervisor

The appointment of William E. Jaqua to the position of western regional supervisor, fertilizer sales, was recently announced by California Spray-Chemical Corp., Richmond, Calif. Jaqua will supervise fertilizer sales in the eleven western states. Calspray's program of expansion in fertilizers includes a new $16,000,000 project now under construction.

Heptachlor Label Acceptances

Velsicol Chemical Corp., Chicago announces that the United States Department of Agriculture has granted the following new label acceptance for heptachlor insecticides:

—heptachlor AE, heptachlor 25% wettable powder, and heptachlor 2½% dust or granular for the control of wireworms or beans and lima beans.

—heptachlor 25% wettable powder or heptachlor 50% wettable powder for seed or planter box treaments for protection of planted wheat seed and seedlings from injury by false wireworms, white grubs and wireworms.

—heptachlor 2E, heptachlor 25% wettable powder, and heptachlor 2½% dust or granular for the control of black vine weevil (Brachrhinus) on Taxus and other nursery stock.

—heptachlor 25% wettable powder or heptachlor 50% wettable powder for the protection of planted grain sorghum seeds and seedlings against kafir ant and false wireworms.

•

NW-Nitro Names Sales Agts.

Harrisons and Crosfield (Canada) Ltd., has been named exclusive sales agents for the distribution of chemical fertilizers produced by Northwest Nitro-Chemicals, Ltd. The company's twenty-two million dollar plant, now under construction at Medicine Hat, Alberta, Canada, is scheduled for completion in the fall of 1956. Products for distribution will include ammonium nitrate and two grades of ammonium phosphate fertilizer, with a total annual sales volume in excess of ten million dollars.

Northwest Nitro - Chemicals, Ltd., is controlled by Commercial Solvents Corp. and the New British Dominion Oil Co., Ltd., of Alberta, Canada. The company will be operated under a long term management contract with Commercial Solvents Corp.

•

Union Publicity Program

The success of Union Bag & Paper Corp.'s publicity program in behalf of the fertilizer industry has prompted the company to continue this campaign during 1956.

"To date we have released five stories in this series," reports S. K. Bradley, Union's vice president in charge of multiwall bag sales. "Each of them went to the editors of 2500 weekly farm newspapers. All of them stressed the part good fertilizer practices play in successful farm management."

•

U. S. Potash Advances Two

John E. Fletcher has been appointed assistant sales manager of U. S. Potash Co., New York. Mr.

L. R. Boynton

J. E. Fletcher

Fletcher joined the company in 1949 and served as sales representative in the southeastern territory and most recently in the midwestern territory.

L. Ralph Boynton has been appointed southern sales manager and will continue to operate from the Atlanta office where he has been manager since September 1945. Mr. Boynton joined the company in 1940 and has served as southeastern sales representative as well as Atlanta office manager.

•

Plant Food-Duggan Merge

Plant Food Corp., Los Angeles, has recently completed a merger with the Charles E. Duggan Co., Pomona and Riverside, California, distributors of agricultural chemicals. Mr. Duggan, who is well known in Western agricultural circles, has been retained to supervise the Pomona Division.

•

Texas NH_3 Terminal Opened

A large high-pressure ammonia storage terminal has been placed in operation by Mid-South Chemical Corp. at Harlingen, Texas. The terminal includes a battery of sixteen 30,000 gallon tanks with unloading facilities for barges operating on the Intracoastal Waterway. Ellis T. Woolfolk, president of Mid-South, said it will be the distribution center for a network of smaller distributing stations the company will establish in the Lower Rio Grande Valley.

Shell Research Director

S. H. McAllister has been named director of Shell Development Co.'s agricultural research division. He succeeds D. L. Yabroff, who joins Shell Chemical Corp. in New York.

•

Black Leaf Names Munger

Appointment of Clark M. Munger to the newly created position of merchandising manager of Diamond Black Leaf Co. was announced recently.

Mr. Munger will be responsible primarily for coordinating and expediting the company's distributor-dealer merchandising program, covering Black Leaf brand insecticides and herbicides used by commercial growers and home gardeners

Mr. Munger was formerly with the Barnes Manufacturing Co., Mansfield, O., producers of plumbing brass goods, pumps and water systems, where he was advertising and sales promotion manager since July, 1954.

•

Flavin Joins Pitts Coke

The research and development department of Pittsburgh Coke & Chemical Co., Pittsburgh, Pa., has announced the appointment to its staff of James P. Flavin. Mr. Flavin will be in charge of the experimental greenhouse facilities for the company's agricultural chemicals division.

Mr. Flavin is a graduate of Clemson A & M College, and in 1955 received his master's degree from the University of Florida for work in the fields of agronomy, plant physiology and horticulture.

•

Joshua Awards to Ag Firms

Four producers of agricultural chemicals have been voted "Joshua" award certificates for distinguished use of match book advertising in 1955.

Entries of Carbide and Carbon Chemicals Co., New York; Mathieson Chemical Co. of Pheonix, Ariz., the Mid-South Chemical Co., Memphis, Tenn., and Shell Chemical Co., were selected.

More than 300,000 firms were eligible for the competition.

Farm Supply Coops Sell 5.7% More Fertilizer in '54

FERTILIZER sales at wholesale by 19 of the nation's larger farm supply co-ops amounted to $96,784,000 in 1954. This was an increase of 5.7 percent over 1953 sales, which had totalled $91,603,000. Sales of insecticides, fungicides and other farm chemicals by 16 reporting co-ops were up 17.4 percent in 1954 over the previous year. For 1954, the total volume in these commodities was $11,950,000, compared to $10,177,000 for 1953. Fertilizer handled by the 19 reporting co-ops represented only 11 percent of their total 1954 volume of all commodities procured for members and was a slight increase from the 1953 figure of 10.4 percent. The business in insecticides, etc., for 1954 was only 1.3 percent of total volume of all business handled, or a slight increase from the 1.1 percent of total business for 1953.

The tabulation of these and other figures on farm supply co-op operations was prepared by the Farmer Cooperative Service of the USDA and released in September. The statistics cover business handled by 23 wholesale co-ops for the fiscal years 1954 and 1953. Only 19 of the 23 dealt in fertilizer according to the report, and only 16 of the group distributed farm chemicals.

Among the 23 co-ops, G.L.F. Exchange, Ithaca, N. Y., distributed the largest volume of fertilizer at wholesale in 1954, its value being placed at $15,018,504. G. L. F. operates 13 plants for manufacture of fertilizer, the report states.

Second largest distributor of fertilizer at wholesale was Indiana Farm Bureau Cooperative Association, Indianapolis, its figure for 1954 being $11,545,397, produced in three member-owned plants.

Closely approaching the Indiana figure was that of the Illinois Farm Supply Co., Chicago, whose 1954 distribution at wholesale was $11,458,188. This co-op does not manufacture fertilizer, the report indicates.

Southern States Cooperative, Richmond, Va., has 5 manufacturing plants from which fertilizer worth $10,540,398 was distributed last year. Farm Bureau Cooperative Association, Columbus, O., operates six fertilizer producing facilities, whose total 1954 distribution at wholesale was $7,036,802. Other co-ops on the list of 23 distributed fertilizer varying from $4 millions down to less than a quarter of a million dollars in value. Only two of these latter operated their own manufacturing facilities.

Many other major regional co-operatives which handle the marketing of their members' crops, milk, cattle, etc., performed extensive supply purchasing services, including the procurement of fertilizer for members.

•

ESTON CHEMICALS DIVISION of American Potash & Chemical Corp., Los Angeles, recently completed two years without a lost-time accident. 100 persons are employed in the division.

superior grinding equipment since 1891

BRADLEY PNEUMATIC HERCULES MILL

Provides a uniform grind from 20 to 325 mesh. Floor level installation provides easy accessibility . . . lowest installation and maintenance costs. Durable, non-clogging vibratory feeder for dependable, worry-free operation . . . even on material with some amount of moisture.

for Fine grinding of limestone phosphate rocks, etc.

for Semi-fine grinding of agricultural limestone

BRADLEY HERCULES MILL

From rough to finish in one low-cost operation. Automatic electric feed control eliminates manual operation. Rugged, dustless construction, maximum accessibility, keep maintenance costs at an absolute minimum. In sizes to meet any requirements at moderate cost.

For complete information, write for catalogs No 61-62

Bradley PULVERIZER CO.

LONDON ALLENTOWN, PENNA. BOSTON

LINDANE

...The BEST for P.C.O.'s

ORTHO Lindane offers

- High efficiency factor
- Excellent control of wide variety of insects
- Ease of formulation
- 100% gamma isomer
- Combines effectiveness with economy

Attention P.C.O.'s:

ORTHO Lindane is high in purity — can be purchased in prepared formulations under the ORTHO brand name of ISOTOX. A variety of ISOTOX formulations in liquid, wettable and concentrate form are available for P.C.O.'s.

Call your nearest ORTHO sales office for full details and free explanatory literature.

World leader in scientific pest control

ORTHO

SCIENTIFIC PEST CONTROL

T.M.'S REG. U.S. PAT. OFF.: ORTHO, ISOTOX

CALIFORNIA SPRAY-CHEMICAL Corp.

Executive Office: Richmond, California

Maumee, Ohio	Portland, Ore.	Whittier, Calif.
Medina, N. Y.	Sacramento, Calif.	Caldwell, Idaho
Linden, N. J.	San Jose, Calif.	Maryland Heights, Mo.
Shreveport, La.	Fresno, Calif.	Oklahoma City, Okla.
Goldsboro, N. C.	Orlando, Fla.	Phoenix, Arizona
	Paris, France	

In Canada, Ortho Agricultural Chemicals Limited, Vancouver, B. C.

On all chemicals, read directions and cautions before use.

NEWS Breviries

FOOD MACHINERY AND CHEMICAL CORP., announced that a central research laboratory, to be staffed by 150 people, will be built in the Princeton, New Jersey area.

The FMC Chemical Divisions (which accounted for 44% of the corporation's gross income of $233 million in 1954) are Becco Chemical, Fairfield Chemical, Niagara Chemical, Ohio-Apex, Westvaco Chlor-Alkali and Westvaco Mineral Products, producers of a wide variety of industrial, agricultural and specialty chemicals. A 45,000 square foot building is scheduled for completion by July of next year.

AC

BEMIS BRO. BAG CO., St. Louis, has announced that the Flexible Package Co., of Chicago, a wholly owned subsidiary, was scheduled to move to Terre Haute, Ind., late in October.

A new building for the subsidiary is expected to be completed soon after the end of the year. A. D. Hoeppner will be manager. The products to be manufactured include a complete range of polyethylene bags in all styles and sizes, including Bemis-patented specialties.

AC

S. A. GUERRIERI has been appointed to the technical staff of the Lummus Co., New York, designing engineers and constructors.

AC

WILLIAM B. FRANCIS has been named as a sales representative for the Black Leaf house and garden line of pest control products in Texas for Diamond Black Leaf Co.

AC

ROBERT M. SALTER, chief of soils research for the U. S. agriculture department and former head of the department's soil conservation service died last month. He was 63 years old.

AC

FERTI-NUR MANUFACTURING CO., Coleman, Texas, is a new fertilizer firm established recently to sell a liquid fertilizer made from sheep manure. R. L. Jones and P. J. Reeves are owners.

AC

LION OIL DIVISION of Monsanto Chemical Co., is completing new wharf facilities at their new plant at Luling, La.

AC

CONTINENTAL SULPHUR & PHOSPHATE CORP., Sulphardale, Utah, recently began construction of a $1,500,000 operation for extracting sulphur from surface ores.

AC

VIRGINIA POLYTECHNIC INSTITUTE has invited pest control operators from five states to attend a pest control operators' short course at the Institute Nov. 9-11.

AC

STAUFFER CHEMICAL CO., New York announced plans last month for the construction of a new multi-million dollar petrochemical plant at Lousiville, Kentucky for the production of carbon tetrachloride, chloroform, methylene chloride and anhydrous hydrogen chloride.

AC

BREA CHEMICALS, INC., Los Angeles, shipped its first carload of "prilled" ammonium nitrate fertilizer from its new plant early in October.

AC

GENERAL ANILINE & FILM CORP., New York, announces the construction of a new 50-ton per day chlor-alkali plant at Linden, N. J. The $5 million facility was designed and is being built by the chemical plants division of the Blaw-Knox Co., Pittsburgh.

AC

VIRGINIA CAROLINA CHEMICAL CORP., Richmond, Va., has just celebrated its 60th anniversary. The out put of several firms was combined in 1895 by S. T. Morgan and S. D. Crenshaw to form V-C.

AC

ALLIED CHEMICAL & DYE CORP. announced recently the consolidation of its sales offices in Los Angeles, and Kalamazoo, Mich.

AC

FUNERAL SERVICES for Oscar Johnston, 75, founder and first president of the National Cotton Council, were held Oct. 4th at Greenville, Miss.

AC

R. J. ENGLEHARDT has been named vice president of J. C. Carlisle Corp., Denver, manufacturers of fertilizer plants.

AC

AMERICAN POTASH & CHEMICAL CORP., Los Angeles, announces the appointment of Henry De Armond as assistant to the company treasurer, L. A. Adams, at the company's Los Angeles headquarters.

AC

PHILIP MORRIS INC. presented a $10,000 grant in support of an expanded tobacco research program to the Agricultural Experiment Station of North Carolina State College, Raleigh, N. C.

AC

ST. REGIS PAPER CO.'s forestry scholarships for the southern area were presented October 3rd, at the 80th annual meeting of the American Forestry Association in Jacksonville, Florida, by Edward R. Gay, executive vice president of St. Regis.

AC

A MULTI-MILLION DOLLAR chemical plant, was dedicated Oct. 7th by Shell Chemical Corp. in Norco, La. The plant makes allyl chloride and chlorohydrins.

DIAMOND insecticides and herbicides are known for dependable potency

Diamond's research and development center in Painesville, Ohio

We make sure of it here

So you can count on peak performance here

Write for literature on any of our products, and feel free to consult our technical staff when you have special problems. Your inquiries are welcome. DIAMOND ALKALI COMPANY, 300 Union Commerce Building, Cleveland 14, Ohio.

DIAMOND ALKALI CHEMICALS

Diamond Chemicals

DIAMOND AGRICULTURAL CHEMICALS

- DDT
- BHC
- LINDANE
- MITICIDE K-101 (Ovex)
- Seed Disinfectant
- 2,4-D Weed Killers
- 2,4,5-T Brush Killers
- Grain Fumigants
- Wettable powders, emulsifiable and oil solutions; and dust concentrates based on our technical grade chemicals

and many other chemicals that help farmers, gardeners, cattlemen and orchardists.

STANDARD STEEL CORP., Los Angeles announces that it has nine large rotary dryers and three coolers now under construction for the fertilizer industry.

Costing more than $730,000, these dryers and coolers, along with ammoniators and granulators, are integral components of fertilizer-making units and will go to plants scattered across the nation and into Canada.

AC

WALLACE K. BELIN, was recently appointed plant manager of the Monsanto Mexicana, S. A. plant.

AC

AMERICAN POTASH & CHEMICAL CORP., Los Angeles, has announced a 20 per cent increase in salt cake production.

AC

W. D. PERRY was recently appointed packaging specialist for California Spray-Chemical Corp., Richmond, California.

AC

CHESTER R. BEAM, formerly an inorganic chemist with the United States Bureau of Mines at Albany, Ore., has joined American Potash & Chemical Corp., at Trona, Calif.

AC

RICHARD D. NORTHCRAFT recently jointed the technical development staff of Pennsylvania Salt Manufacturing Co., of Washington.

AC

STAUFFER CHEMICAL CO. announced that net income for the first 9 months of 1955 increased 44% to $6,475,000, or $2.75 per share, from $4,508,000, or $1.29 per share earned in the same period 1954. Net sales climbed to a record $79,704,000 from $64,174,000 last year.

AC

EMULSOL CHEMICAL CORP. Chicago, has elected Dr. Charles E. Fuchs a member of its board of directors.

AC

VICTOR L. SHELDON, formerly assistant professor of soils at the University of Missouri, Columbia, has joined the agronomy staff of Olin Mathieson Chemical Corp.'s western fertilizer division.

AC

EDGAR C. LLOYD, JR., was recently named sales representative for northern Mississippi and southern Arkansas by Fulton Bag & Cotton Mills, New Orleans.

AC

FLORENCE LAWN FERTILIZER CO., Florence, S. C., obtained a charter last month to buy, process and sell fertilizer and fertilizer materials. R. O'Harra is president.

AC

CENTRAL FARMERS FERTILIZER CO., Chicago, have obtained a $4 million loan for a calcium metaphosphate plant at Georgetown, Idaho. The 7½ million plant will turn out a 0-60-60 fertilizer, and is expected to be in production by 1958.

AC

C. L. MONSON, Spencer Chemical Co.'s agricultural sales representative for Iowa during the past five years, has been advanced to the post of product sales supervisor, in Kansas City, Mo.

AC

THE CALIFORNIA MOSQUITO Control Assoc., will meet Jan. 15-18 at the Elks Club, Marysville, Calif.

HANDBOOK
of
INSECTICIDE
DUST DILUENTS
and
CARRIERS

Now Available . . .

Revised Edition,
Edited and Prepared by

D. E. Weidhaas and
J. L. Brann, Jr.
Cornell University, Ithaca, N. Y.

250 Pages

$4.75 in USA $5.25 Elsewhere

THE original publication "Properties and Commercial Sources of Insecticide Dust Diluents and Carriers" prepared by T. C. Watkins and L. B. Norton of Cornell University has been brought up to date and completely revised by Drs. Weidhaas and Brann. The new edition contains commercial information as well as data obtained in research conducted at Cornell University, Ithaca, New York.

The book is bound in a flexible leatheroid cover, for handy, practical use. It will be available about Oct. 15.

TABLE OF CONTENTS

Botanicals
Sulfur
Tripolite
Diatomite
Calcium Limes
Magnesium Limes
Calcites
Dolomites
Gypsum
Mica
Vermiculite
Talc
Pyrophyllite
Montmorillonoid Group
Kaolinite Group
Attapulgite Group
Unidentified Clays
Phosphates
Indeterminates
Synthetics

Postpaid if check sent with order

TEAR OFF AND MAIL

DORLAND BOOKS
P.O. Box 31
Caldwell, N. .

Enclosed is our check for $4.75 (Canada and Foreign, $5.25) covering a copy of the HANDBOOK OF INSECTICIDE DUST DILUENTS AND CARRIERS. It is understood that we may return the book within ten days for a full refund.

Name .....
Company .....
Address .....
City and State .....

Suppliers' BULLETINS

Spraying Systems Catalog

Catalog No. 30 has just been published by Spraying Systems Co., Bellwood, Ill., covering spray nozzles and accessories for all types of farm ranch, orchard and garden spraying. This new 20 page catalog is the most complete catalog of its kind ever printed and includes illustrations, description and spraying data on all types of nozzles for boom spraying, broadcast spraying, hand spraying and airplane spraying.

Information on a wide range of accessory equipment is also included, such as adjustable valves, strainers and spray guns. Included in the catalog are tables for calculating field coverage of chemicals in terms of gallons per acre and gallons per minute.

•

Esso Buln. on Herbicides

Esso Standard Oil Co. offer a 16 page bulletin describing the use of "Flit 38" in cotton weed control. The bulletin reviews methods of preparing, planting and cultivating the field . . . and suggests rates of herbicide application.

Another bulletin outlines the use of "Bayol N-300" in the control of tobacco suckers. Bayol N-300 is an emulsifiable oil, which provides controlled flow of emulsion down the stock.

•

N. Soln. Applicator

Schelm Bros., Inc., East Peoria, Ill., are manufacturing and distributing a nitrogen solution applicator known as the "Senesac-Schelm 'Do-it-Yourself' Applicator." It is equipped with 100" tool bar and four knives. A spray boom is available to convert the unit into a trailer sprayer for applying all types of non-pressure solutions or insect and weed chemicals.

Schelm also offers a transport unit, consisting of a 500-gallon aluminum pressure tank and skid mounted on a two wheel trailer.

•

Panogen Seed Treater

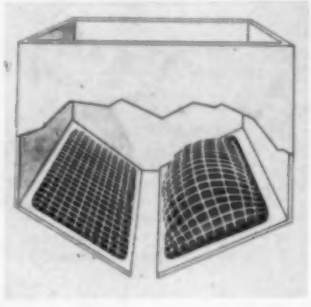
A new automatic seed treater for application of Panogen Liquid Seed Disinfectant, is announced by Panogen, Inc., Ringwood, Illinois.

Designed for liquid seed treatment of wheat, oats, barley, flax, cotton, etc., treater is reported to incorporate several new features for smoother, more efficient operation.

•

New Bin-Feeding Aid

A new-type attachment for bins and hoppers, to facilitate material flow and handling is offered by Gerotor May Corp., AC, Baltimore, Md. The equipment known as "PneuBin" consists of a steel plate faced with a plastic diaphragm. This panel is installed on the inner wall of bin or hopper and connected to plant air supply through a controller. By a "breathing action," the panels keep the material in motion, and prevent materials from the tendency to hang-up on the sides of the containing walls. The panels are reportedly being used successfully with viscous, granular, or dust-like materials.



Liquid Ammonia Bulletin

Commercial Solvents Corp., New York, have just issued Technical Data Sheet #4, on Aqua Ammonia." The bulletin lists the physical properties of liquid ammonia, suggestions on handling and storage, physical properties, toxicity and first aid data.

•

Hough Industrial Loader

A new two-wheel-drive "Payloader" tractor-shovel, model "HAH,"

has just been announced by The Frank G. Hough Co., Libertyville, Illinois.

The new model, which has a truck capacity of ¾ cubic yards and a heaped capacity of 1 cubic yard, incorporates all of the features of the smaller "HA" model which was introduced in February.

Of particular interest to users is the bucket breakout action which permits 40 degrees of tip-back at ground level. The new model "HAH" has a breakout force of 4,500 pounds, a lifting capacity of 4,000 pounds and a carrying capacity of 3,000 pounds at 4 m.p.h.

Especially designed for stockpile work, this new unit has a short turning radius and rear-wheel power steering for fast maneuverability.

•

Pipe I.D. Sandblaster

A new sand blasting tool for the cleaning of pipe and tube, called the "Torno-Blast Sandstorm Pipe Cleaning System," is offered by J. C. Fennelly Co., San Francisco.

Torno-Blast cleans the I. D. of pipes and tubes by whirling sand or other abrasive substance under great pressure inside the pipe. Until now the process of removing scale and other deposits has been accomplished by the use of chemicals, by pickling, or with a turbine tool.

ARE YOU USING THIS

Proven Carrier

IN THE FAST GROWING FIELD OF

GRANULAR INSECTICIDES and HERBICIDES?

Terra-Lite®
BRAND
VERMICULITE

Mineral has amazing absorption properties —flows freely at high concentration and Terra-Lite LOWERS YOUR CARRIER COSTS

Before formulating plans in the *granular* field, consider the *plus* advantages Terra-Lite® gives you

- Lower carrier cost per lb. of finished product.
- Over 27,500,000 particles per lb. (28/65 mesh).
- High absorbency—free flowing even when high concentrations are formulated.
- Practically non-reactive.
- Release of toxicants is assured regardless of moisture conditions.
- Quick service—available from over 40 plants.

Free Information
about this amazing
FREE-FLOWING
GRANULAR Carrier

The use of granular toxicants for the control of insects and weeds is growing at a rapid rate. Terra-Lite brand vermiculite has already proven itself an ideal carrier in this field. The Terra-Lite "plus benefits" which will be major factors in further broadening this "new market" are: ease of application and the use of conventional equipment. And though Terra-Lite is extremely lightweight it can be uniformly spread without loss. Before deciding on your formulating plans in the granular field, consider the many advantages of Terra-Lite vermiculite. Send for sample and information today.

Terra-Lite®
Division Zonolite Company
135 S. LaSalle St., Chicago 3, Illinois

Terra-Lite, Dept. AC-115
Division Zonolite Company
135 S. LaSalle St., Chicago 3, Illinois

Please send current reports on commercial use of the new granular carrier, *Terra-Lite* vermiculite, and also actual samples, as checked:

☐ FREE INSPECTION SAMPLE ☐ FREE WORKING SAMPLE

Name_____

Firm_____

Address_____

City_____ Zone____ State_____

CONTROL OFFICIALS

(*from page 53*)

show 16 basic combinations of raw materials for formulating the finished products. The third requirement is that the manufacturer have a well-engineered plant. Each plant should be individually designed for the capacity required and for the manufacture of formulas compatible with local territory and crops. These plants usually are a batchtype operation built for versatility and fast production."

Most important part of the operation is sales and distribution, Mr. Ellsworth said. "Two general methods of distribution have been used. The most common method is distribution through dealer truckers, or custom applicators. This is classified as wholesale distribution and competes directly with dry bulk fertilizer . . . The second method, which is coming into greater acceptance, is the retail delivery to the famer's storage tanks. Sometimes the manufacturer supplies these storage tanks," he continued, "and this brings the fertilizer to the farmer at a lower cost on a 'do-it-yourself' program."

He explained that the break-even point for sales is approximately 2,000 tons a year. Beyond the 10,000 ton capacity, he stated, "it appears to be advisable to build a second plant, separately incorporated, in an adjacent territory."

"The manufacturers of bulk liquid fertilizer in the North Central states all are small as the fertilizer industry goes, and the total output probably has not been more than one percent of the fertilizer production this year in any one state. We would hesitate to predict the future of the business."

Mr. Ellsworth said the two main advantages of complete liquid fertilizer are the saving in time and labor and high nitrogen placed in one application. He said other advantages include ability to add insecticides and weed killers to the fertilizer, quick availability of the nutrients, high-speed application and even distribution on the field. "The product is ideal for irrigation systems," he concluded.

Three other speakers completed the program. W. C. Winton, Dept. of Agriculture, Oklahoma City, Okla., said there is a need for closer cooperation between control officials, agricultural agencies and the extension service. Walter Scholl, gave out statistics on distribution of bulk fertilizer in 1953-54. Mr. Scholl is with the USDA at Beltsville, Md. The other speaker, Paul T. Truitt, executive vice president of the National Plant Food Institute, told the control officials of the progress made by the group since it was formed by the consolidation of the National Fertilizer Association and the American Plant Food Council. He requested more and better statistics on fertilizer grades and ratios used in the various states.

Pesticide Officials

THE pesticide control officials considered 14 problems at their States Relations meeting Oct. 14. Many industry men sat in on the discussion and paid particular attention to remarks on residues, label statements, custom formulations, and other subjects.

No formal action was taken on any of these questions, except on the question of regulating custom applicators of pesticides. The association approved a committee report at the regular session which stated that custom applicators should come under the jurisdiction of the state entomologist.

In his presidential address, Ernest A. Epps, Jr., made some random remarks about the job of the control official. He said that the officials must decide what constitutes an active ingredient and should set up standards to judge the effectiveness of pesticides. In passing, he noted that the boll weevil may be building up resistance to chlorinated hydrocarbon insecticides.

Both C. O. Barnard and B. E. Conley discussed the problem of safety in using pesticides. The former, executive secretary of the Western Agricultural Chemicals Association, said industry has done a good job promoting safety, but that, unfortunately, formulators have no control over field use of pesticides. Mr. Conley, secretary of the committee on pesticides of the American Medical Association, told of the work of his committee, organized in 1950, to increase public understanding of the problems connected with pesticides. He said the committee also sends pertinent information on treatment to physicians.

The final speaker, G. L. Brown, of Rohm & Haas Co., told about the manufacture and testing of surfactants intended for pesticidal use.

Other officers elected by the associations were J. D. Patterson, Oregon, and Bruce D. Cloaninger, South Carolina, vice president and secretary - treasurer respectively of AAFCO; and H. J. Fisher, Connecticutt, and A. B. Heagy, Maryland, vice president and secretary-treasurer of AAPCO.

The National Plant Food Institute gave a banquet in honor of the fertilizer control officials Oct. 14. A similar dinner for the pesticide group was given the following evening by the National Agricultural Chemicals Association.★

WASHINGTON REPORT

(*From Page 69*)

in many fields the thought is there is justification for the cost of the Food and Drug's activity in this respect to be covered by appropriations rather than payment by individual companies. There is probably some justification for this position, and the agricultural groups of the country may take special interest in it.

* * *

You can bet there will be vigorous discussions on insect resistance during the National Cotton Council's Insect Control Meeting at Memphis, Tennessee, December 15 and 16. Most of the big discussions will probably occur during the closed sessions immediately preceding the open meeting.

During the closed-door meetings Federal and State entomologists will be tackling the thorny problems of

why pest control in certain spots of the cotton belt seem to be particularly difficult and why certain types of chemicals appear to be of limited effectiveness. This always is an important meeting for the industry and the discussions this year are apt to be particularly significant.

* * *

Washington visitors likely will be more than pleased at the pleasant and comfortable office occupied by the new National Plant Food Institute at 1700 K Street N. W. What's more, you'll receive a warm reception. All's well that meets the eye.

* * *

The National Agricultural Chemicals Association is launching some aspects of its promotional program following discussion at its annual meeting in Spring Lake, New Jersey. A series of specially transcribed radio features is being planned for release sometime early next year. They will probably feature both herbicides and pesticides. The program is being contemplated following the successful release of a number of similar radio features earlier this year.

The information is so prepared that specialists in the various fields present their official views to both farmers and the general public. This part of the Association's educational program is meeting with enthusiastic favor.★★

NUT CROP PESTS

(*From Page 57*)

in the Gulf Coast Counties of Mississippi.

Walnut husk fly, which was first found in Washington back in 1954, has been collected again this year in this state. California reports that this pest is now found throughout the Sonoma Valley in Sonoma County and has been recorded for the first time in southern end of San Joaquin Valley. Fall webworm has been general on pecans in Louisiana, with many orchards completely defoliated. It has been less abundant than usual, however, on pecans in Fort Valley area of Georgia. Black pecan aphid heavily infested pecan trees in northwest Louisiana in early October.

House Flies and Mosquitoes Problem

HOUSE flies and mosquitoes have been a problem recently in many states, especially in those areas having storms and floods earlier this season. In September, Rhode Island had heavy populations of mosquitoes in various parts of the state, and Pennsylvania recorded very heavy numbers with severe biting in Northumberland and Snyder Counties. Populations of these pests were very high in the Rio Grande Valley of Texas, following floods caused by hurricanes. Colorado had an appreciable increase this year over 1954 in equine encephalomyelitis of horses in the eastern part of the state. This disease is carried by mosquitoes and other arthropods. The serious flooding in many areas of Massachusetts contributed to severe infestations of both mosquitoes and house flies. Kansas, Utah, Maryland and North Dakota were other states reporting house fly populations of some concern.★★

CANADIAN ESA

(*From Page 41*)

center around resistant species which require new chemicals other than 2,4-D and 2,4,5-T. More efficient and more rugged application equipment is another need.

Although 2,4-D and 2,4,5-T, the speaker indicated, will probably continue to be the work horses for initial spray applications in woody growth control, certain other new brush-killer chemicals have shown considerable promise in experimental plot work—particularly against species of brush resistant to 2,4-D and 2,4,5-T. Amino-triazole and 2,4,5-trichloro-phenoxypropionic acid esters have given excellent control of oak, while 2,3,6-trichlorobenzoic acid appears effective on a number of resistant species. Water solutions of sodium 2,2-dichloro-propionate have controlled conifers in large scale field tests and promise an economical means of eliminating nuisance species such as pine, balsam and spruce.

He predicted an expanding market for chemical brush control materials in Canada, with the greatest potential appearing to be to the railroads with their large acreages of brush-covered right-of-way.

Eric L. Barry of the CACA staff spoke on "Your Association and Public Relations." Mr. Barry suggested that the success of the association will depend upon two important factors—first, its establishing its standing as spokesman for the industry, and second, how successful it is in selling the public on the importance of the industry as a major factor in food production.

Both of these basic jobs, he asserted, depend upon public relations, and he reminded that you have public relations whether you like it or not. They can be good—depending on what the association and the industry does—and they can be improved, he reminded, by everyone in the industry through correct sales practices, good products, well-planned advertising, etc.

The industry still has a big job to do in selling the public on its importance, he counseled. Even though only two percent of the material appearing in the press of the nation may be detrimental, this small percentage attracts attention all out of proportion to its volume. "There is much that individual companies and the association have to do to spread the gospel about the benefits which accrue from the use of agricultural chemicals," the speaker concluded.

The morning session, October 14th, opened with a panel discussion on "The Setting of Administrative Tolerances for Insecticides in Canada." Dr. E. P. Aikman, general manager of The Nichols Chemical Co., Ltd., acted as chairman of the panel, members of which included M. G. Allmar, Dept. of National Health and Welfare, Ottawa, P. M. Overholt, Dept. of Agriculture, Ottawa, A. T. Sinclair, North American Cyanamid, Ltd., and chairman of the Administrative Tolerances Committee of CACA, and Dr. W. T. Reed, California Spray-Chemical Corp., Haddonsfield, New Jersey.

Mr. Overholt advised the group that in administering the Pest Control Products Act, the first concern

of the Plant Products Division of the Canadian Dept. of Agriculture has been the insecticidal or fungicidal effectiveness of a pesticide, but residue hazards are also of definite concern, for the two prime factors in considering any product for registration are "Will it work?" and "Can it be used safely?"

The Pest Control Products Act, he reminded, provides that registration may be refused if a product is thought to be detrimental or seriously injurious to public health when used according to recommendations. For some products, he added, data on residues will in the future become a more definite requirement of the Plant Products Division for granting registration, but the procedure in applying for registrations under the Pest Control Products Act will remain unchanged, except when special information on residues is called for.

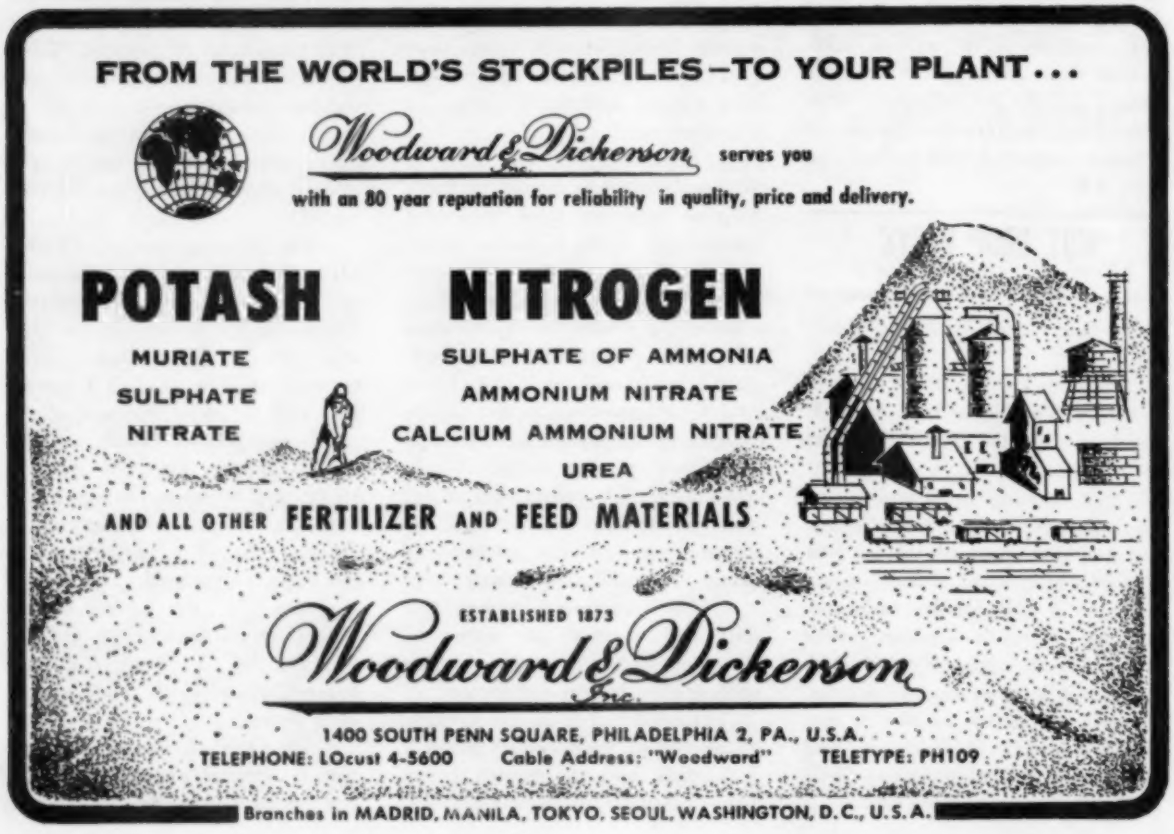
When it is necessary for a manufacturer to apply for a tolerance, at the same time that an application is made for registration under the PCP Act, the application to set a tolerance, he indicated, should be sent direct to the Food and Drug Directorate. Their office at the same time should be given some degree of assurance that the product is acceptable for agricultural use in Canada—as otherwise it would not be practical for them to devote the rather extended time necessary for the study of residue and toxicological data. From U. S. concerns, a statement that the product has been reviewed by the U. S. D. A. and is regarded by them as acceptable for the purposes represented would, he indicated, be adequate.

As to determination of "efficacy of a pesticide," the PCP Act provides for consideration of this point principally in relation to claims made and the directions for use. The Minister may refuse to register if, in his opinion, the product is believed to be unsuited for the purpose for which it is sold or represented. It has been their practice to consider as "efficacious" or "suited for the purposes for which it is sold" any product shown by suitable evidence to have an appreciable effect on the pest concerned.

When reviewing directions for use, they keep in mind the level of residues to be expected when the product is used as directed. When a tolerance has not been established under the Food and Drugs Act, they regard the tolerance as zero.

Dr. Reed's comments, reporting on how the Miller Bill is presently functioning in the U. S. A., are reported more fully elsewhere in this issue (see pages 37-38).

Dr. J. A. Evans of E. I. du pont de Nemours & Co., Wilmington, spoke on "Recent Agricultural Chemical Developments from du Pont." Speaking specifically of seed treatments—a relatively low volume pesticidal product—he said that there is probably no type pesticide marketed that compares with these materials in the benefits rendered per unit of product. Seed treatments return more for the dollar invested than any other chemical product used. Organic mercurials introduced in the late twenties are today the standard


FROM THE WORLD'S STOCKPILES—TO YOUR PLANT...
Woodward & Dickerson Inc. serves you
with an 80 year reputation for reliability in quality, price and delivery.
POTASH
MURIATE
SULPHATE
NITRATE
NITROGEN
SULPHATE OF AMMONIA
AMMONIUM NITRATE
CALCIUM AMMONIUM NITRATE
UREA
AND ALL OTHER FERTILIZER AND FEED MATERIALS
ESTABLISHED 1873
Woodward & Dickerson Inc.
1400 SOUTH PENN SQUARE, PHILADELPHIA 2, PA., U.S.A.
TELEPHONE: LOcust 4-5600 Cable Address: "Woodward" TELETYPE: PH109
Branches in MADRID, MANILA, TOKYO, SEOUL, WASHINGTON, D.C., U.S.A.

for treatment of small grains and cotton. Current developments in this field are toward liquid mercurials—to improve ease of use. Dr. Evans referred also to the introduction of organic non-mercurials, and the growing use of combined insecticide-fungicide treatments.

In the herbicide field, he mentioned a du Pont development of recent years—the "substituted ureas." When properly used, these products will successfully control weeds without damage to crops; and in higher concentrations will give extended or "sterilant" action against most annual or perennial weeds in areas where no crops are growing—that is around barns, silos, fence lines, etc.

Reviewing the use of fungicides, Dr. Evans recalled that during the past few seasons except for 1955, cereal rusts have taken a heavy toll of the Durum wheat crop in Canada. Losses reached in the neighborhood of $200,000,000 in Canada in 1954. Nabam and Zineb, he indicated, give control, but must be used as a form of insurance each year to protect the farmer's investment. More and more wheat growers are adopting as a routine practice the treatment of their Durum crop with fungicides.

du Pont has been testing a new Thiram fungicide this year, he reported. 1955 tests indicate that this new product controls apple scab, while still giving an excellent finish on tender varieties of fruit such as Golden Delicious.

On the subject of insecticides, the speaker summarized tests which have been conducted in Midwestern United States over the past two seasons and which have demonstrated that good control of the corn borer can be obtained with the use of granular insecticides—the granular form having the additional advantage of reducing residues on fodder. du Pont's product EPN 300 has shown good results the past season in this form, he advised.

C. W. Gates of the Naugatuck Chemicals Division of Dominion Rubber Co., Elmira, Ontario, spoke on "Thioneb Fungicides." He described Thioneb 50W, a new fungicide and seed protectant which has proved in test work to be highly fungicidal against a wide spectrum of fungi. It belongs to the Thiuram family and contains polyethylene thiuram sulfide as active ingredient. It is available for experimental use as a wettable powder containing 50% active Thioneb under the name Thioneb 50W. It is formulated so it has good wettability, suspension and adhesion to foliage.

Having been demonstrated to be extremely potent as a fungicide, it would appear to be a valuable material for controlling diseases of fruit, vegetables and ornamentals, the speaker stated. It is also effective as a seed protectant. Dosages are yet to be determined. They may, he indicated, be in the neighborhood of one or two pounds per one hundred imperial gallons.

Touching on the point of possible phytotoxicity, he indicated that no injury has been reported to plants, fruit trees and flowers sprayed at the rate of two pounds 50% wettable powder per one hundred gallons of

CHEMICALS FOR AGRICULTURE

✓ Check High Analysis Value

COPPER SULPHATE

Crystals
Superfine
Powdered
Basic Copper Sulphate
✓ 53% Copper as metallic

ZEE-N-O

Neutral Zinc 56% Zinc as metallic
The Highest Test Nutritional Zinc
If you use Zinc Sulphate be sure to check
✓ Greater Performance and Lower Cost of Zee-N-O

MANGANO

Neutral Manganese
55% Manganese as metallic
The Highest Test Nutritional Manganese
✓ Greater Performance and Lower Cost
Non-irritating to Workmen

W. R. E. ANDREWS SALES, INC.
1505 Race Street, Philadelphia 2, Pa.
Since 1926
Agricultural Chemical Specialties

Berkshire

SPECIALISTS

in

MAGNESIA

for

AGRICULTURE

EMJEO (80/82% Magnesium Sulphate) Calcined Brucite (fertilizer grade) 70% MgO Calcined Magnesite 85 to 95% Mg O

POTNIT

(95% Nitrate of Potash)
for
Special Mixtures and Soluble Fertilizers
Other Fertilizer Materials

INSECTICIDES - FUNGICIDES

Mercury Compounds
for Agricultural Use

DITHIOCARBAMATES

Ferric — Zinc

EXPORT-IMPORT

BERKSHIRE CHEMICALS, Inc.

420 Lexington Ave., New York 17, N. Y.
55 New Montgomery St., San Fran. 5, Cal.
Cable Address — "Berkskem" New York

spray. No leaf stunting effect and no serious russeting of apples has been reported.

The new product is compatible with DDT, Malathion, Nicotine Sulfate, Aramite, Aldrin, Endrin and 10% Phenyl Mercury Acetate. It is not compatible with lime.

Its acute toxicity is in the same range as that of commercial fungicides and is relatively low. Chronic toxicity data, he indicated, will be reported later. There is no evidence of skin irritation to humans.

Two accurate micro-analytical methods have been developed for residue determination.

Final speaker on the program was R. R. Wangerin of Monsanto Chemical Co., St. Louis, reporting on the "Overall Monsanto Development Program." Mr. Wangerin discussed Monsanto's new program of direct selling to a limited area in the United States, indicating the reasons behind the company's decision to sell direct.

He described three new herbicides which will be marketed exclusively in the coming season under the Monsanto label. Two of them, CDAA and CDEA are alpha-chloroacetamides, while the third member of the group, CDEC, is a dithiocarbamate. Intended for pre-emergence use, they control annual grasses and corn. Applied at the rate of three to four lbs. per acre, he indicated, they give excellent control of weedy annual grasses such as foxtail, crabgrass, annual blue grass, cheat grass and wild oats. They also control certain broad leaf weeds such as pigweed, carpet weed and purslane.

These compounds were tested on more than 2,700 plots in 1954 and in large scale field tests on more than 750 acres of cropland during 1955. Results indicate they will safely, effectively and economically control annual grasses in a wide variety of agronomic and horticultural crops including grass family crops such as corn and barley, he reported.

CDAA he described as the best of the three, giving most consistent performance under a wide variety of conditions. The inherent selectivity of CDAA, he said, will make possible for the first time potential control of such deeply germinating grasses as wild oats.★★

EFFECTS OF MILLER LAW

(*From Page* 38)

in view of the rapidity with which resistance is developing in many of our pests, and the ever-increasing demand for more food due to the rapidly increasing population. Naturally, these expenses must be passed on to the consumer through increased prices for the pesticide.

(3) I would say that the Miller Bill has brought about a greater realization by the pesticide industry, and the food processing industry, of the problems and needs facing each other. It is now necessary for the pesticide industry to determine from the food processor which pesticides on which crops, and under which methods of usage, will result in residues on the produce which will permit the food processor to market products acceptable for consumption. The food processor's requirements must be considered along with the requirements of the producer.

(4) One of the most vitally affected relationships is that between the chemical industry and food producer or farmer. Operating under the requirements of the Miller Bill means that the pesticide manufacturer can no longer solely depend upon the recommendations of the various extension agencies to inform the farmer how, when and where to use his products, nor can he depend upon the farmer to learn enough about the use of pesticide chemicals so that he can, himself, properly and safely use our products. Through the means of the label on the container, supporting literature, and through the contact of trained sales and service personnel, the pesticide manufacturer now faces the responsibilities of teaching the user how to use control materials. We must also provide information and cooperation with our universities in teaching the local extension personnel, such as county agents, the representatives of food processors, cooperative marketing organizations and others, the proper methods of using our products. This service will also

increase the cost of doing business, but is one that we cannot and should not try to avoid.

(5) In order to expedite and to make the provisions of the Miller Bill operate with a minimum of inconvenience and hardship to everyone, the personnel and the agencies charged with drawing up and enforcing these regulations have, along with the technical departments of the industry, and the research and administrative departments of our agricultural colleges, found it necessary to work in close cooperation. Industry has found it necessary to designate certain trained personnel to learn the proper techniques for collecting data, organizing the data and presenting the required petitions for tolerances. These men have found it desirable to confer with various officials involved and thus have avoided much lost motion and to date have managed to meet the requirements of the Miller Bill sufficiently well so that orderly marketing and utilization of pesticides has not been disrupted, nor seriously curtailed.★★

INDUSTRY TRADEMARKS

(*From Page 67*)

GRANUFORM, in lower case, open face script, for pelletized fertilizer. Filed Dec. 13, 1954, by F. S. Royster Guano Co., Norfolk, Va. Claims use since Dec. 1, 1954.

AS-15 in capitals, for antibiotic preparation for agricultural use for controlling plant diseases. Filed Nov. 23, 1954 by Chas. Pfizer & Co., Inc., Brooklyn. Claims use since Oct. 25, 1954.

BALCOM'S BUG BUTCHER in script and heavy capitals with picture of trademark, for agricultural chemicals insecticides, and fungicides. Filed Mar. 4, 1954 by Balcom Industries, Greeley, Colo. Claims use since Dec. 1, 1944.

ESTONMITE in heavy capitals, for miticides. Filed May 3, 1954, by American Potash & Chemical Corp., Los Angeles, Calif. Claims use since Feb. 28, 1954.

d-CON-FLI-CON set in picture of quadrilateral design, for insecticide. Filed Dec. 8, 1954 by The d-Con Co., Chicago. Claims use since Aug 2, 1954.

GY-FUME in capitals, for insecticides and nematocides. Filed Aug. 6, 1954 by Geigy Chemical Corp., New York. Claims use since Oct. 25, 1949.

TRIPPLE XXX in picture of three roses, for rose bush feed. Filed March 11, 1955 by The Stadler Fertilizer Co., Cleveland. Claims use since Feb. 17, 1954.

TENCOR TRIPLE "46" in capitals, for fertilizer. Filed Feb. 7, 1955 by Tennessee Corp., New York. Claims use since Oct. 18, 1954.

BLU OX'N in capitals and lower case against a blue background, with drawing of oxen. For fertilizer. Filed Sept. 24, 1954, by National Fertilizer Co., Kansas City, Mo. Claims use since Sept. 1, 1954.

CRACKERJACK, in capitals, for fertilizer. Filed Nov. 5, 1954, by International Minerals & Chemical Corp., Chicago. Claims use since the year 1925.

BACTEX, in capitals, for organic and mineral fertilizer. Filed Dec. 1, 1954, by Bactex Co., San Antonio, Texas. Claims use since the year 1950.

BULL DOG, in capitals, for fertilizers. Filed Dec. 23, 1953, by The Davison Chemical Corp., Baltimore, now by merger W. R. Grace & Co. Claims use since about 1927.

CHEMCO, in shaded green capitals, for anhydrous ammonia. Filed Aug. 5, 1954, by Chemco, Audubon, Iowa. Claims use since about Mar. 1, 1953.

FERTI-LIQUID in stencil, shaded capitals, for liquid fertilizer. Filed P. R. 8-20-53; Am. S. R. 10-6-54 by Clover Chemical Co., Eighty-Four, Pa. Claims use since July 1, 1953.

OLD GLORY in stencil caps, with drawing of top hat, and letters Tobacco Fertilizer, for fertilizers. Filed Oct. 18, 1954 by Smith-Douglass Co., Norfolk, Va. Claims use since spring of 1940.

Accurate Weight Control Protects your PROFIT margin

No. 2224 SACKING SCALE

With Exact Weight Sacking Scale you can sack, weigh and visibly check every bag — eliminate overweights that eat into your profit margin. Simple to operate and fast — just two controls, bag clamp handle and feed valve handle. Easy-to-read, magnified indication assures exact weight — eliminates need for trimming. Exact Weight sacking scales have been first choice of processors for over 25 years. Available in a number of models for every location — portable, floor or overhead mountings.

On-the-line CHECKWEIGHER

Gives fast and accurate check of open end and valve-type bags right on your production line. Assures positive weight control where visible checkweighing is not included in your sacking operation. Short lever fall and hydraulic damping provides fast and accurate readings. Model 1302-R can be mounted on floor or recessed—other models available with commodity platter or sack rest.

MODEL 1302-R

Sales and Service Coast to Coast

Exact Weight Scales

Better quality control

Better cost control

THE EXACT WEIGHT SCALE COMPANY

948 W. FIFTH AVENUE, COLUMBUS 8, OHIO

In Canada: P. O. Box 179, Station S, Toronto 18, Ont.

GRANULATION

IS NOW POSSIBLE FOR ANY SIZE FERTILIZER PLANT

Increase your fertilizer profit now by producing highest quality granular fertilizer with a Blue Valley Granulator. Only a Blue Valley Granulator offers you

- **Lowest First Cost**
- **Lowest Installation Cost**
- **Lowest Operating Cost**

Write, wire, or call us now—

BE WISE— GRANULATE THE GLASPEY WAY

Blue Valley

BLUE VALLEY EQUIP. MFG. & ENGR. CO.

LAURENT AND N. TAYLOR TOPEKA, KANSAS

BROWN SUGAR in heavy letters, for rock phosphate, used as a fertilizer and plant food. Filed Dec. 22, 1954 by M. C. Boyle Phosphate Co., Chicago. Claims use since Dec. 21, 1953.

SUBURBAN HI-N in outline letters set in box with words "Agricultural Ammonia," for anhydrous ammonia. Filed Nov. 5, 1954 by Suburban Farm Service Co., Whippany, N. J. Claims use since the fall of 1952.

CROWN KOKUA in heavy letters with "Kokua" in brush type, for mulch paper. Filed Dec. 13, 1954 by Crown Zellerbach Corp., San Francisco. Claims use since Feb. 12, 1951.

RX-15 in bold type, for liquid fertilizer. Filed Dec. 27, 1954 by Garden Research Laboratories, New York. Claims use since Mar. 1, 1953.

FERTILO in capitals, for organic compost. Filed Jan. 10, 1955 by Eric W. Eweson, Newport, R. I. Claims use since Dec. 14, 1954.

FERTILIS in capitals, for fertilizers. Filed Jan. 17, 1955 by International Minerals & Chemical Corp., Chicago. Claims use since Nov. 17, 1925.

MELLO-GREEN in capitals, for fertilizers. Filed Jan. 17, by International Minerals & Chemical Corp., Chicago. Claims use since Mar. 5, 1954.

EDITORIALS

(*From Page 31*)

were members of larger companies, and 25 were suppliers of manufacturers.

A further indication of the interest in the Round Table is the fact that 100 per cent of the attendance is "in the meeting room," and participating in the discussion sessions following each general report. The group has no formal organization, dues, fees, officers or reading of the minutes, etc. Just a group of practical "production men," who know manufacturing problems and will exchange this information with others.

FERTILIZER ROUNDTABLE

(*From Page 36*)

lem to granulate, but the lower nitrogen formulas are somewhat difficult due to highwater content required to help forming granules. To obtain good granulation, Mr. Spillman advised, the plant also used approximately 100 pounds of 60 degree sulphuric acid in the 6-12-12 and 6-18-18 to produce additional needed heat and some plasticity. He gave the group a set of interesting charts showing actual performance records of manufacturing for a full four days on each grade, and followed the operation through with formulas used, water added at the ammoniator, ammoniation rate, water driven off by drier heat and sulphuric acid, cubic feet of gas consumed per ton, temperatures, analyses and screen tests. He stated most of the 14000 tons of granular manufactured from March 1 to June 15 was shipped within 48 hours after manufacture, and in some cases the fertilizer was shipped direct from production with no trouble on condition. Mr. Spillman did state, however, several complaints were made on severe packing of 6-18-18 shipped during hot weather, July and early August, and that he was checking into the possibility of dusting the mixture with a fine clay either at time of storing to bin, or at bagging time. To help granulation, Mr. Spillman, informed the group, the plant used 15 pounds of "Minco Conditioner" a fine clay-dolomitic limestone product. Slides were used by Mr. Spillman to show, the members of the Fertilizer Round Table, complete flow diagram of the ammoniating, granulating, drying, cooling, and classifying equipment designed, engineered and built by The A. J. Sackett Sons Co., Baltimore. Mr. Spillman further commented for the present at least, granulation is no "Utopia," that it will take a lot of hard work, continuous research and experimenting to keep improving manufacturing methods, formulas, and quality. He stated that meetings of this type will be helpful and that a two way flow of information is the answer to success. Full details of the ammoniation and granulation methods will be described in an article in the December Issue of *Agricultural Chemicals*.

Our report on other addresses at the Fertilizer Round Table, will appear as part 2 in the December issue of *Agricultural Chemicals*. These will include the following:

"Temperature and moisture relationships in granulation," Rodger C. Smith, Eastern States Farmers Exchange.

"A new process development in

nitra-phosphate manufacture" A. J. Sackett, Jr., A. J. Sackett & Sons.

"The ammoniator-granulator installation at the Virginia Carolina Chemical Plant." "Dryers and coolers in the Ammoniation and granulation of fertilizers" by E. J. Leister and G. Halldorson, Ed. Renneburg& Sons Co., respectively.

"The Swift process of granulation" by J. E. Iliff, Blaw Knox Co.

"Standardization of screen sizes," Wayne King, S. Tyler Co.

"Role of potash salts in ammoniation-granulation," E. Kapusta, U. S. Potash Co.

"Use of clay coatings to retard hygroscopicity in granulated ammoniated fertilizers," M. W. Thomas, Thos. Alabama Kaolin Co.★★

CVPFA ELECT

(*From Page 48*)

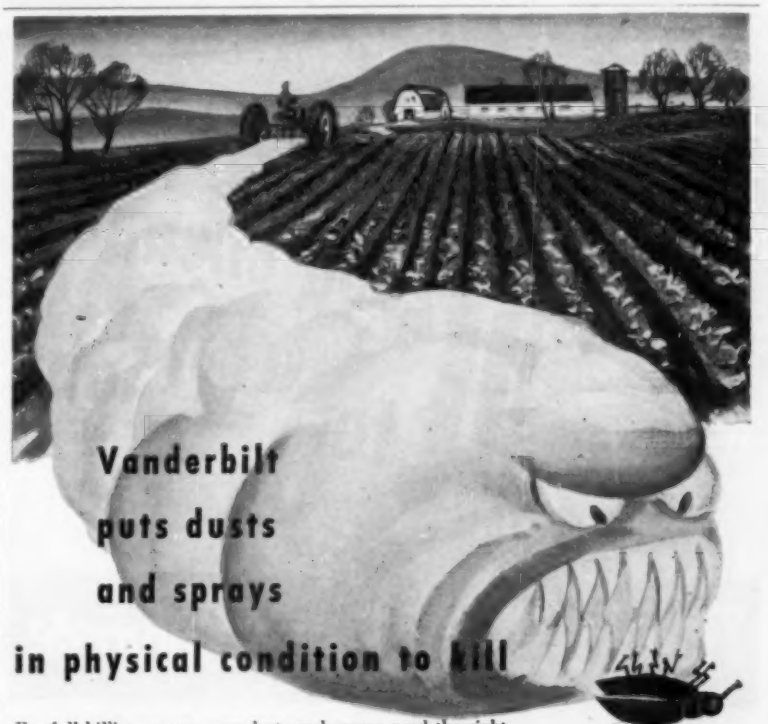
ment Station already has intensive programs underway to aid the grower and formulator . . . and reminded that greater emphasis is being placed on pest control because: (1) of the need for reducing loss of yield to pests, and (2) greater acreages being planted to some crops result in greater pest populations.

In an analysis of potential markets for the pesticide industry, Glenn C. Klingman, North Carolina State College, Raleigh, N.C., outlined the history of weed control and herbicides. He told his listeners that the biggest future in weed control lies in the home garden market, and pointed out that in the next ten years, home lawns will offer as great a market to formulators and manufacturers as all other agricultural uses for herbicides.

In developing this theme, Dr. Klingman quoted USDA figures showing that losses to insects and weeds in 1954 totaled about 8.6 billion dollars . . . that of this amount 5 billion was due to weeds. He referred to research expenditures in 1954, pointing out that 595 million dollars was spent for research connected with agricultural chemicals (insecticides, fungicides, etc., but excluding weed control.) The research expenditure statistics, observed Dr. Klingman, indicate that the future potential market for agricultural chemicals is recognized and under development.

In connection with weed control in North Carolina, Dr. Klingman noted that in cotton, chloro IPC is used to some extent . . . giving 80 to 85 per cent control, although it presents some handling problems. Dalapon, at 25 pounds per acre, has been tried for control of Bermuda grass in grapes . . . and although controlling the grass, causes some damage to the grapes. Karmex W, he noted, should be used only where all of the vegetation should be killed . . . around barns, silos, etc. Although very effective, he observed, its cost is, in some cases, a limiting factor. Sodium chlorate and TCA do an effective job, but are not effective for as long a period.

Of the new herbicides, Dalapon is largely replacing TCA, commented Dr. Klingman. It is used in control of Johnson Grass, CAT Grass and Bermuda Grass at rates one-half that recommended for TCA. Amino triazole, he said, will be more important in the near future. It is still primarily in experimental use, but shows promise on nut sage, Bermuda Grass, Johnson Grass, and as a defoliant.



For full killing power, your dusts and sprays need the right physical properties — to absorb and disperse the toxicant thoroughly — to make them cling, cover, and stick in doing their deadly work. Vanderbilt carriers, diluents, and dispersing agents are *specially developed* to give dusts and sprays these important physical properties that mean more efficient coverage and increased lethal effectiveness in the field.

PYRAX ABB
The most widely used pyrophyllite in agriculture. Adheres electrostatically to dry foliage. Ideal for aircraft dusting.

DARVAN #1 & #2
Outstanding dispersing agents. Produce increased toxicant effectiveness through better dispersion of wettable concentrates.

CONTINENTAL CLAY
Superior nonalkaline carrier for high-bulk dusts and wettable concentrates, remarkable for dispersability, absorption, and flowability.

When you choose Vanderbilt products, you can be sure your dusts and sprays have the right physical properties to make them cover, cling, and kill with full effectiveness.

USE THIS HANDY COUPON →

R. T. VANDERBILT CO.
SPECIALTIES DEPARTMENT
230 Park Ave., New York 17, N. Y.
Please send Bulletin 23D and samples
☐ PYRAX ABB ☐ DARVAN ☐ CONTINENTAL CLAY
NAME_____
POSITION_____
(Please attach to, or write on, your company letterhead)

Karmex DL, he said, is effective at low rates, and will probably warrant increased use and interest in the future. Increased use of oils . . . diesel and aromatic . . . as contact weed killers may also be expected, he remarked.

Two very new herbicides, not yet identified with commercial names, have been under study for two years at North Carolina, and have offered good results in 80 to 90 per cent of the tests. The two compounds are offered by Monsanto Chemical Co., and are known as CDEC and CDAA. Chemically, they include an allyl group, and thus incur some of the handling problems of allyl compounds.

Dr. Klingman observed that the use of dinitros on peanuts offers promise, and that Crag herbicide 1, and 2,4,-D also offer good control.

Dr. Klingman concluded his address with a review of the technical booklets offered by the Virginia and Carolina experiment stations on weed and pest control, use of fumigants, cautions in handling agricultural chemicals, etc. He reminded his audience that these services are available from extension specialists on request.

Triangle Brand Copper Sulphate has been recognized as an effective agricultural chemical for more than sixty years. In sprays (where Bordeaux mixtures are the most reliable), in dusts (if you prefer them) and in fertilizers (for additional enrichment of the soil) Triangle Brand Copper Sulphate has proved itself worthy and dependable. Try these Triangle Brand forms of Copper Sulphate:—

INSTANT (powder) for quick and efficient mixing of Bordeaux sprays.

SUPERFINE (snow), SMALL or LARGE CRYSTALS, all containing 25.2% metallic copper.

BASIC Copper Sulphate in powder form, containing 53% metallic copper.

Write for booklets that will help you solve your agricultural problems.

Control POND SCUM and ALGAE with Triangle Brand Copper Sulphate. Write today for information on how it can help you maintain healthy water conditions.

PHELPS DODGE REFINING CORP.
300 PARK AVE. NEW YORK 22, N.Y. • 5310 W. 66th STREET, CHICAGO 38, ILL.

Industry Discussion

IN an "industry-wide-open" session, members had an opportunity of bringing up for review questions of current or pertinent interest. One observation on marketing stressed that industry should look toward a "long range view," and not sell as though the current sale was an absolutely final one. In a further discussion of selling its products, one member pointed out that a "sale" could only be called such when "it was sold, paid for, used with satisfaction, and when the customer indicated it would be bought again." Still along this same train of thought, another suggestion was that members give greater thought to satisfying the customer. John Diem, Southern Agricultural Insecticide Co., outlined his method of maintaining and servicing the customer . . . and the response he has had from dealers in view of this service. He explained that if there is a complaint from any farmer using his products, it is followed up the same day, with a personal call by one of his representatives, who analyzes the difficulty, and tries to correct the problem.

It was suggested that the industry try to develop more honor and character among its salesmen.

Discussion of the question of equipment for application of insecticide formulations indicated that in some cases the equipment has not kept up with the development of chemical materials . . . and that farmers should be educated to buy better and more adequate equipment. One example cited of poor results said to be due to the insecticide used was actually due to application by inadequate machinery . . . for example single or multiple nozzle sprayers for tobacco *cannot* be used on cotton.

General discussions on the advantages of group life insurance, possibly sponsored by the association, closed the meeting.★★

GOVERNMENT RESEARCH

(*From Page 44*)

with various governmental agencies, more adequate data on the toxicity and usage of pesticides are supplied to the consumer today than ever before. Furthermore, efforts are being made to bring this information to his attention by all audio-visual techniques available. Ignorance is rarely an adequate excuse for misuse.

Another, and perhaps less apparent, benefit that industry receives from the government is the results of basic research performed in government laboratories. While many firms conduct research, many very good pesticide manufacturers and distributors have no facilities for this purpose. The latter organizations depend heavily upon governmental or other institutional research for technical information concerning the manufacture, formulation, or usage of their materials. For example, the Department of Agriculture does research to determine the effect of insecticide accumulations in the soil on the palatability of crops, and studies the quantitative relation between chemical deposits and food quality (Knipling, 1955). Both the Public Health Service and the Department of Agriculture investigate insecticidal residues on edible products and contribute to the design of better machines for the distribution of the pesticides which are manufactured or distributed (Hayes, 1954; Simmons, 1949; Hall, 1955). Exceedingly valuable basic research is performed on the resistance of insects to insecticides, a fundamental problem facing all of us interested in insect control (Simmons, 1954, 1955). Research on mammalian and insect physiology, insect ecology, and basic chemical problems are but a few of many other examples. If this work were not performed by the government, industry would have to assume the responsibility of preventing retardation of public health and agricultural endeavors in this country.

I believe firmly that the government should engage heavily in basic research, and I should like to see this activity expand. I would also like to see industry increase research in the applied field while maintaining an expanding basic research program. Industry's responsibility in our capitalistic democracy is the translation of useful developments into products for mass consumption. While industry and government share in the exploratory work, probably the primary efforts of industry are directed to the final stages of the process. Governmental and industrial research in the field of pesticides are completely complementary. Government research supplies new compounds, new formulations, new applications, and helps protect the industry from public criticism. On the other hand research without industry would be sterile. After industry has conquered the manufacturing and logistic problems, then and only then are the ultimate benefits of government research realized.

Literature Cited

1. Baker, W. C. and Schoof, H. F.: 1955. Prevention and control of fly breeding and animal carcasses. *J. Econ. Ent.* 48(2): 181-183.
2. Batchelor, C. S. and Walker, K. C.: 1954. Health Hazards involved in use of parathion in fruit orchards of North Central Washington. AMA *Arch. Indust. Hyg. and Occup. Med.* 10: 522-529.
3. Bidlingmayer, W. L. and Schoof, H. F.: 1955. Outdoor residual treatments of premises for control of salt marsh mosquitoes. *Mosquito News* (In press).
4. Biskin, M. S.: 1953. Public health aspects of the new insecticides. Amer. *J. Digest. Dis.* 20: 331-341.
5. Biskin, M. S.: 1949. DDT poisoning a serious public health hazard. Amer. *J. Digest. Dis.* 16: 73.
6. Biskin, M. S.: 1949-a. DDT poisoning and the elusive "virus X": a new cause for gastro-enteritis. Amer. *J. Digest. Dis.* 16: 79-84.
7. Biskin, M. S. and Bieher, I.: 1949. DDT poisoning—a new syndrome with neuropsychiatric manifestations. Amer. *J. Psychotherapy* 3: 261-270.
8. Fowler, R. E. L.: 1953. Insecticide toxicology: manifestations of cotton-field insecticides in the Mississippi delta. *Agr. and Food Chem.* 1(6): 469-473.
9. Freeman, G. and Epstein, M. A.: 1955. Therapeutic factors in survival after lethal cholinesterase inhibition by phosphorus insecticides. *New England J. Med.* 253(7): 266-271.

IT'S HERE - IT'S PROVEN

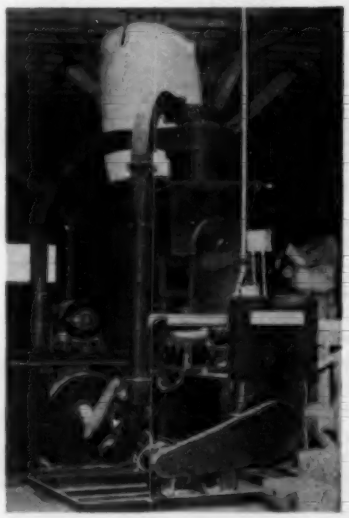
ITS Y-M CO'S. 500 LB. PORTABLE CUT-BACK DUST BLENDING SYSTEM

Capacity — Four to six 500 lb. batches per hour

Space Requirement — 6'6" x 10'6" x 15' O. A. Ht.

DELIVERED TO YOU—READY TO OPERATE

System Includes **— Dust hood at loading station; Sifter; Pre-Mixer at floor level; Pneumatic Conveyor-Blender; After-Mixer with dust collector; Dust hood at packaging station, etc; All motors wired to panel box with push button controls.**



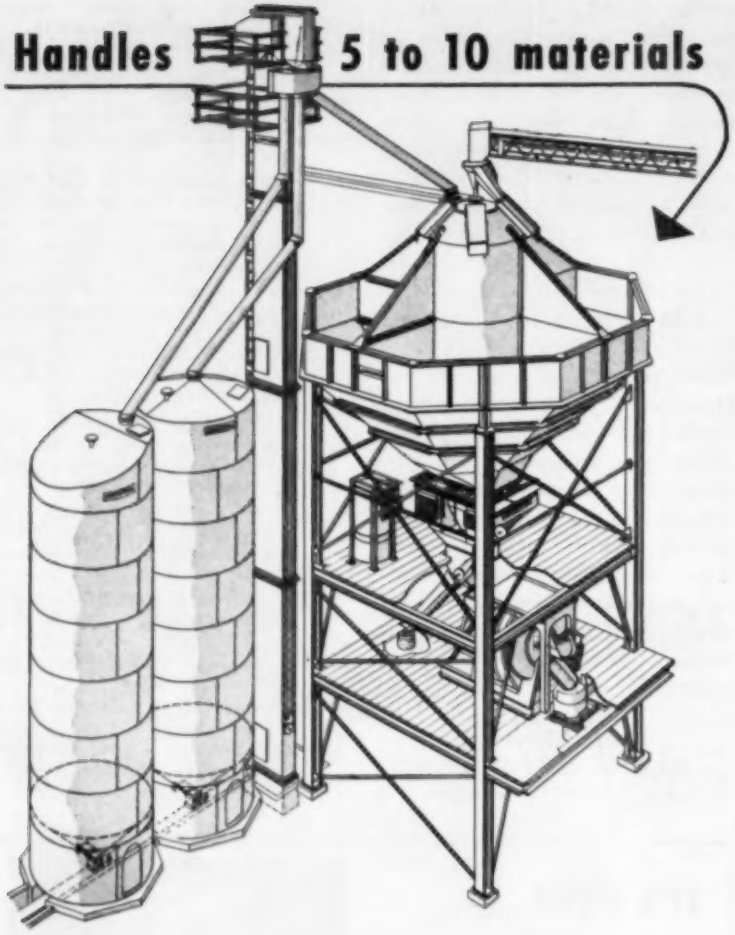
WRITE OR PHONE
YOUNG MACHINERY CO.
MUNCY, PA. TODAY!

Young machinery

Muncy, Pennsylvania - - - 6-3509
Pasadena 8, Cal. - - - - - RYan 1-9373
Oakland 13, Cal. - - - - TEmplebar 2-5391

Export Sales Reps.:
Mercantile Development, Inc.
50 Church St., New York 7 - - BArclay 7-4789

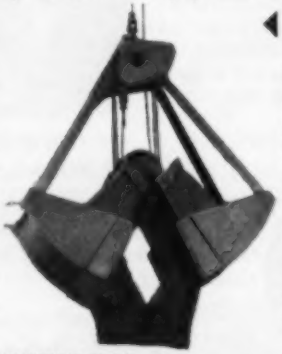
Handles 5 to 10 materials



Bin capacity: 150 to 1100 cubic yards

On fertilizer blending operations, multiple ingredients are instantly available with this Johnson Octo-Bin plant. Overhead storage bin has 4 to 8 compartments arranged around a centrally-located tank having 1 or 2 compartments. Tank is charged by chute from bucket elevator. Open bin compartments can be charged by a second elevator or belt conveyor, with pivoted distributor for feeding materials into proper section of bin.

Plant can be arranged with clod-breaker, vibrating screen and collecting hopper for pulverizing and screening materials before they are fed into the bin. Single or multiple material batchers, with manual or automatic controls, accurately weigh materials at high speed, and discharge into mixer for final blending operation. Let us show you how this multiple-material plant can be adapted to meet your specific requirements. Several other types and sizes of Johnson plants and accessory equipment also available.



Fertilizer buckets —

To stockpile, load and unload chemicals, fertilizers, and other fine-grained materials, Johnson brings you a special clamshell bucket. All-welded, smooth inside and out, it loads fast — gives quick, clean dump. Powerful closing action of hard manganese cutting lips prevents load leakage as you hoist and swing the bucket. 10 wide-rehandling sizes: ¾ to 3 cu. yds. See your Johnson distributor, or write to us.

C. S. JOHNSON Company CHAMPAIGN, ILLINOIS

(Koehring Subsidiary)

AC-8P4BF J548

10. Hall, L. B.: 1955. Suggested techniques, equipment, and standards for the testing of hand insecticide-spraying equipment. Bull. World Hlth Org. *12*: 371-400.
11. Hayes, W. J., Jr.: 1955. The pharmacology and toxicology of DDT. (in Müller): The insecticide DDT and its importance. Basel, Birkhauser (in press).
12. Hayes, W. J., Jr.: 1955-a. Present status of our knowledge of DDT intoxication. *Amer. J. Pub. Hlth* 45(4): 478-485.
13. Hayes, W. J., Jr.: 1954. Agricultural chemicals and public health. *Pub. Hlth Rep.* 69(10): 893-898.
14. Hayes, W. J., Jr. and Simmons, S. W.: 1950. Benefits and hazards of insecticides to public health. *Advances in Chem. Series 1*: 56-60.
15. Kilpatrick, J. W. and Schoof, H. F.: 1955. DDVP as a toxicant in poison baits for house fly control. *J. Econ. Ent.* (In press).
16. Kilpatrick, J. W. and Schoof, H. F.: 1955-a. House fly control in dairy barns with residual treatments of phosphorus compounds. *J. Econ. Ent.* (In press).
17. Kilpatrick, J. W. and Schoof, H. F.: 1955-b. House fly control in dairy barns, rural areas, and dining halls with insecticide-impregnated cords. Pub. Hlth Rep. (In press).
18. Kilpatrick, J. W. and Schoof, H. F.: 1954. House fly control in dairies near Savannah, Georgia, with residual applications of CS-708, NPD, and malathion. *J. Econ. Ent.* 47(6): 999-1001.
19. Knipling E. F.: 1955. Personal communication.
20. Maier, P. P. and Mathis, Willis: 1955. Fly control at dairies with parathion-impregnated cords. *Modern Sanitation*. (In press).
21. Mattson, A. M., Spillane, J. T. and Pearce, G. W.: 1955. Dimethyl 2,2-dichlorovinyl phosphate (DDVP), an organic phosphorus compound highly toxic to insects. *Agr. and Food Chem. 3*: 319-321.
22. Merkin, S.: 1954. Warning: poison in milk! *Nat. Police Gaz. 159*: 8-9.
23. Perry, A. S., Mattson, A. M. and Buckner, A. J.: 1953. The mechanism of synergistic action of DMC with DDT against resistant houseflies. *Biol. Bull. 104*: 426-438.
24. Roark, R. C.: 1955. Personal communication.
25. Schechter, M. S., Green, N., and LaForge, F. B.: 1949. The synthesis of cyclopentenolones of the type of cinerolone. *Amer. Chem. Soc. J. 71*: 1517.
26. Schechter, M. S., Green, N., and LaForge, F. B.: 1949-a. Constituents of pyrethrum flowers. XXIII. Cinerolone and synthesis of related cyclopentenolones. *Amer. Chem. Soc. J. 71*: 3165-3173.
27. Scott, A. E.: 1954. Health foods doorway to death. *Sir 11*: 44-45, 62-64, May 1954.

28. Simmons, S. W.: 1955. New developments in malaria prevention and control. Industry and Tropical Health, Second Conf. Harvard School Public Health, Boston.
29. Simmons, S. W.: 1954. Public health significance of insect resistance to insecticides and future orientation of vector control programs. 1st International Symposium on Control of Vectors of Disease, Supplemento ai R. C. Sup. Sanit., Rome, pp. 97-125.
30. Simmons, S. W.: 1949. The Technical Development Division of the Communicable Disease Center. Official Organ Inter-Amer. Assn. Sanit. Engin. 2(3): 272-282.
31. Smith, L. E.: 1940. Patent No. 2,217,566 (covering the use of phenothiazine as an insecticide).
32. Sumerford, W. T., Hayes, W. J., Jr., Johnston, J. M., Walker, K. and Spillane, J.: 1953. Cholinesterase response and symptomatology from exposure to organic phosphorus insecticides. Amer. Med. Assn. Arch. Ind. Hyg. and Occupational Med. 7: 383-398.

FERTILIZER VIEWS, NEWS

(*From Page 51*)

Tests at Michigan Agricultural Experiment Station

THE Michigan Agricultural Experiment Station investigated the rate at which granulated fertilizer released its phosphorus nutrient as compared with the same fertilizer in a non-granulated form. Their results are summarized in Table 1 (Pg. 55) and Table 2, above. It is seen that the granulated material releases its nutrient content readily, about 84% of the phosphorus diffusing into the surrounding sandy soil within 24 hours, and 69% into loam soil. More than half of the total phosphorus moved out of the granules within a space of 3 hours. Table 1 shows the rate of dissolution at different soil moisture levels for both soil types.

How efficient is a granulated fertilizer in feeding a crop? This question is answered by the data in Table 2. Ten different soil types were used in this experiment. The test crop was wheat.

Fixation of phosphorus and potash by soil chemicals is in most cases the direct cause of a reduction in the plant feeding efficiency of a fertilizer. The efforts of many agricultural engineers and agronomists in recent years have been directed to finding means by which to retard or prevent this soil fixation. A phosphatic material which is quickly and all water soluble, such as monocalcium phosphate or ammonium phosphate, could conceivably suffer the greatest degree of soil fixation because of its quick solubility. Theoretically, at least, it would seem desirable not to have all the phosphate quickly soluble for most soil conditions, if feeding the growing crop efficiently is the object.

The experience of many investigators in the United States and Europe is that a fertilizer having granules varying in mesh size between

TABLE 2.

Concentration of fertilizer phosphorus in dry wheat tissue.

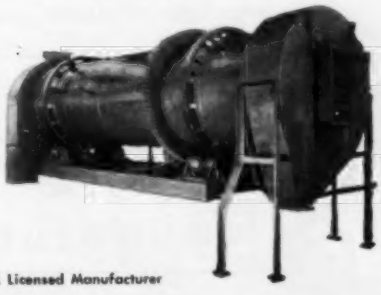
Sampled 11 days after planting.

Soil Type	Percent P_2O_5 derived from the fertilizer			
	Granulated		Non-Granulated	
	banded	mixed	banded	mixed
Rifle muck	21.71	5.68	19.93	5.25
Brookston clay loam	13.03	4.93	11.96	4.49
Brookston loam	14.59	6.89	16.33	6.64
Conover loam	18.06	7.77	23.01	8.67
Miami loam	16.64	9.30	20.89	4.50
Wisner loam	8.58	3.89	8.27	4.95
Hillsdale sandy loam	19.34	5.42	18.01	2.10
Fox sandy loam	16.08	5.38	17.35	6.19
Emmet loamy sand	17.77	7.10	17.08	7.05
Oshtemo loamy sand	9.27	3.48	10.38	3.36

DRYERS AMMONIATORS* GRANULATORS* ELEVATORS COOLERS CONVEYORS for the Fertilizer Industry

CONVENTIONAL DRYER

Heavy-Duty rotary unit with furnace, burner, breeching and air handling system. Used for ammoniated granular fertilizers and other chemicals. Also DehydrO-Mat Variable Inclination Dryers (Pat. pend.).



ROTARY COOLER

Highly efficient shelf design for quick thermal release, with special feed and discharge breechings. Rotary seals prevent air losses.

EDW. RENNEBURG & SONS CO. Baltimore 24, Maryland, U.S.A.

* TVA Licensed Manufacturer

Literature and information on request.

SPERGON
SEED PROTECTANT

Works best when you need it most

Reports come in from all over the country: Corn yield increased up to 25%...with Spergon. Soybean yield increased up to 53.5% ...with Spergon. Sorghum stands increased up to 33%, with alfalfa yields up substantially in every area... *all with Spergon.*

These are yield increases that really pay off at market time. Spergon will pay off for you by preventing seed decay, "damping off" and many other fungus diseases so rampant during cold, wet planting weather.

Spergon lubricates your seed for less planter breakage and easier planting. It is relatively inexpensive and, in addition, is non-hazardous to humans and animals.

Order Spergon® from your local supplier today. Write, wire or phone us if unable to locate immediate source of supply.

Naugatuck Chemical

Division of United States Rubber Company
Naugatuck, Connecticut

producers of seed protectants, fungicides, miticides, insecticides, growth retardants, herbicides: Spergon, Phygon, Aramite, Synklor, MH, Alanap, Duraset.

2 and 5 millimeters is more desirable than granules smaller or greater than this range.

Truth in Advertising

ALONG somewhat the same line: advertising agencies at times prepare copy about fertilizer behavior that is astonishing to an agronomist. For example, an "ad" about ammonum nitrate states that it "provides a steady supply of nitrogen from the time it is spread until your crops are ready for harvest" and talks about "two-step action." Wonder what a good steady rainfall would do to it, especially on open sandy soil? And how is one to control bacterial action on "the sustained growth ammonia nitrogen" so as to keep this form releasing nitrogen "slowly throughout the growing season?" Advertising copy of this kind may, in the long run, do more harm than good in building confidence in our industry.★★

PART OF FORMULATOR

(*From Page 41*)

a satisfactory pesticide-fertilizer mixture, the pesticide formulation must meet at least two specific requirements. If a liquid is used in the pesticide-fertilizer mixture, the concentration of the pesticide must be high enough to give the desired amount of toxicant in the end product without adding too much liquid, and thereby making the mixture sticky or lumpy. If a dry pesticide is to be used, the pesticide should be formulated with an inert of approximately the same particle size as the average particle size of the fertilizer. If the pesticide formulation is too fine or too coarse, it will tend to separate out in layers and does not give a uniform mixture.

Another new type of pesticide formulation is the granular product. Granular compositions are designed usually to control soil infesting pests. The primary feature of a granular composition is that the heavy particles will filter through dense foliage and reach the ground. Therefore, it is essential that the percentage of fines or dust be kept to a minimum. Many granular compositions fail in meeting this particular requirement.

Granular insecticides are effective also in controlling certain other pests; e.g., budworm on corn. The heavy particles get down in the whorl, where dusts or spray mists will not reach.

During the past two or three years, a host of dry bait formulations for control of flies have been placed on the market. Some are good and others not as satisfactory. This type of formulation has a place in the pest control field, but they present certain problems to the formulators.

How long can a material be stored?—is the question which is asked most often. I know each of you think of a dozen materials about which you would like to have this question answered. Unfortunately, this type of information is seriously lacking. In many cases, there is no answer, and in others, the information is based only on very carefully controlled conditions. Certainly this problem will become more acute as we get into compositions containing mixtures of two or more chemicals. The problems encountered most recently in the formulation and storage of products containing endrin has made all of us more conscious of this fact.

The problem and cost of registering a product is no small item. The laws are generally designed to protect the formulator as well as the user, and recognizing these facts, you in the formulating industry are anxious to produce effective materials which can be used safely. With the passage of the Miller Bill, a greater emphasis has been placed on correct labeling to insure that the user will not suffer any losses due to too high a residue at harvest time. Consequently, it may be expected that an even greater emphasis will be placed on labels in the future. It is suggested that each formulator give full thought to his own product labels.

The question of facilities and equipment is one that plagues the formulator all of the time, and it becomes more serious as he has to shift from one chemical to another, or from one type formulation to another. It is only the company that has adequate facilities and labor saving devices that can continue to show a profit in this highly competitive industry.

Last but not least, is the question of safety. Prior to World War II, the formulator of arsenical compounds thought he was dealing with a toxic compound. He was, but when we stop to consider how toxic some of our present day pesticides are, it is like comparing a fire cracker with an atomic bomb. Fortunately, the agricultural chemicals industry has, and is, giving full consideration to safety in handling and production, and thus enjoys a high safety rating.

Although, we in research, claim that we are looking for less toxic materials, it appears that many of the new materials developed are equally as toxic, if not more toxic, than compounds already in use. The situation seems to call for more effort in developing safe methods of formulating and applying these materials.★★

NITRIC PHOSPHATE

(*From Page 46*)

commercial production in Europe and in the United States.

According to the figures in Table I, Germany and Switzerland were among the earliest producers of nitric phosphate. It is also interesting to note that processes producing calcium nitrate, or products containing free calcium nitrate, find only limited application; The majority of formulas have a $N:P_2O_5$ ratio of 1, and with few exceptions, those marketed in Europe usually have a high K_2O content.

Among the newest nitric phosphate plants, in operation since 1953, are Gewerkschaft Victor Chemische Werke at Castrop-Rauxel, Westfalen, Germany; the Imperial Chemical Industries, Ltd. at Billingham, Durham, England; Allied Chemicals and Dye Corp. at South Point, Ohio; and the Associated Co-Operatives, Inc. at Sheffield, Alabama. These four plants employ distinctly different processes, and produce four different products each with an analysis meeting local requirements.

The difference in the process employed and in the composition of the products marketed, as shown in

Sales Program
"PLAYIN' POSSUM?"

Awaken it with PRIVATE LABELS!

If your sales program sometimes "lays down and plays dead" then it's high time you discover the magic of packing *your* products under *your* private labels for distribution in *your* market.

If you're tired of pushing the same old lines (but at varying prices) as every competitor in your territory . . . if you're tired of seeing repeat orders lost to competition then you owe it to yourself to investigate private labels today!

Through private labeling *you* are assured an exclusive on *your* high quality line in *your* market . . . Your customers can't reorder from anyone but YOU!

PRIVATE BRANDS, INC., is ready with a complete service to help you "awaken sleeping sales" in your market! It will pay you to investigate today!

Write, Wire, Phone for Particulars

PRIVATE BRANDS, INC.
300 SOUTH 3rd ST.—DEPT. A-3
KANSAS CITY 18, KANSAS

prevent costly caking in fertilizer with...

EAGLE-PICHER CELATOM

(Diatomaceous Earth)

HIGHLY ABSORBENT! Fine, light particles capable of extremely high absorption plus great bulking value make Eagle-Picher Celatom an ideal anti-caking agent in hygroscopic fertilizers.

ELIMINATES CLOGGING! Celatom keeps the fertilizer flowing freely for uniform and effective distribution of the vital plant foods. And because Celatom is inert, it has no chemical reaction with the commonly used fertilizer ingredients.

OTHER APPLICATIONS! Celatom is also an excellent carrier for *toxicants* such as Malathion. It is an effective diluent for many types of *insecticides* . . . an absorbent for *weed control chemicals* . . . and has many diversified uses in *fungicides, defoliants, rubber and plastic products, polishes and cleaners, asphalts and concretes.*

Since 1843 EAGLE EP PICHER

WRITE TODAY! We'll be glad to provide free samples of Celatom and laboratory assistance at no obligation. Write to: *The Eagle-Picher Company, Cincinnati 1, Ohio.*

put new growing power in your special mixes

Versen-OL®

IRON CHELATE

. . . makes plants thrive in both acid and alkaline soils

From the citrus groves of Florida to the pineapple farms of Hawaii, VERSEN-OL Iron Chelate has proved its amazing ability to put *new growing power* in *all* types of soil. Because of chelated iron, more than a million Florida citrus trees — once yellow and dying from iron starvation — are now healthy, profitable producers. VERSEN-OL Iron Chelate not only prevents and cures Chlorosis, it also multiplies crop and improves yield . . . regreens leaves . . . flushes bloom . . . stimulates growth and speeds maturity. Vegetables, peanuts, citrus, stone fruits, azaleas, roses and hibiscus; ornamentals, blueberries, alfalfa, lawn grasses and many other types of growth respond vigorously to the chelated iron treatment.

VERSEN-OL is the *first* agricultural iron chelate developed for all soils regardless of pH. Another product, *Versene Iron Chelate*, is especially effective for acid-loving plants and the acid soils of the South. Both are economical and easy to use. For premixing with fertilizers, they are absorbed on vermiculite and supplied in handy 50 lb. bags. Dustless, free-flowing and low in toxicity, Versene Iron Chelate and VERSEN-OL Iron Chelate require no special handling precautions.

WRITE Agricultural Chemicals Sales today for further information and bulk prices.

THE DOW CHEMICAL COMPANY
MIDLAND • MICHIGAN

Dow

Table I is due, in part at least, to the availability and price of secondary essential raw materials, particularly phosphoric acid and potash; the amount of specific process information acquired one way or the other; the existing local market for certain nitric phosphate compounds; and the soil and crop characteristics and climatic conditions in the area covered within the shipping radius. These factors are reflected either in the unit cost of production, or in the selling price of the product.

Notwithstanding the fact that the sulfur crisis is over and sulfuric acid saving is no longer a problem of great concern in some countries, worldwide interest in the nitric phosphate process is still growing. At least six new plants (14, 24) are under construction, including plants in Sweden (4), California and Taiwan (Formosa) (14), and several others are in the planning stage.

The TVA at Wilson Dam, Alabama, the U. S. Department of Agriculture at Beltsville, Maryland and some European nitric phosphate manufacturers, including the State Mines of the Netherlands at Geleen, Limburg have done much work on the physical and chemical properties of nitric phosphates, but little has been published so far.

Briefly, nitric phosphates are hard granules measuring 2-4 mm. (1, 3, 7) or larger, with an apparent density of about 1 gm./ml. (14). They look very much like granulated superphosphate granules except for the characteristic light yellow tinge.

Depending upon the process used, most of the contained nitrogen is in the form of ammonium nitrate (NH_4NO_3); the rest is present as ammonium chloride, potassium nitrate and/or mono-ammonium phosphate, of the phosphate compound present, dicalcium phosphate, both anhydrous- and/or -dihydrate, is predominant, but mono-calcium phosphate and apatites (hydroxyl- and carbono-) can also be present in considerable quantities (6, 12, 14).

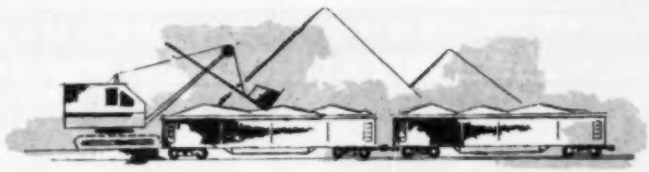
The presence of ammonium nitrate imparts a characteristic hygroscopicity which, however, is not as much a problem as it is in fertilizer-grade ammonium nitrate. TVA workers have shown that nitric phosphates keep well in asphalt-coated, multi-walled kraft bags (13, 20, 21, 32), while in Europe, bulk storage of nitric phosphate is a commercial practice (14).

Nitric phosphate is primarily a P_2O_5-carrier and should be treated as such. Depending upon its origin, it may contain some P_2O_5 in water soluble form (11, 27, 28, 33). This fact alone reflects, to some extent, the P_2O_5 solubility standard, and the soil and crop characteristics in the country of origin. Greenhouse and plot tests in the Netherlands, England and the United States (5, 8, 9, 10, 11, 19, 27, 28, 29, 33) have not corresponded with field tests, in which nitric phosphate was compared with superphosphate results. This is partly due to the fact that the soils, testing crops, and the experimental conditions were not the same, and the nitric phosphates vary in chemical composition and water solubility. Nitric phosphates contain a number of inorganic salts which have recently been found capable of raising or lowering the solubility of dicalcium phosphate (31) and thereby influencing crop response to this compound. This factor apparently has not been taken into consideration in heretofore published reports on the fertilizer efficiency of nitric phosphate, However, this much can now be asserted: as a P_2O_5-carrier, nitric phosphate compares favorably with superphosphate in most neutral and acid soils and, depending upon the water-soluble P_2O_5 content, also in some alkaline soils.

The author expresses his sincere gratitude to Dr. V. Sauchelli for reviewing and editing the manuscript.

Literature Cited

(1) Anon., *Chem. Eng.*, 60 (8):115-6 (1953).



JEFFERSON LAKE
Bright Canary Yellow
CRUDE SULPHUR
99.5% MINIMUM PURITY
Produced by our
3 MINES IN TEXAS and LOUISIANA
and our
SULPHUR RECOVERY PLANT - MANDERSON, WYOMING
•
Carload Shipments
MOLTEN - FLAKED - LUMP

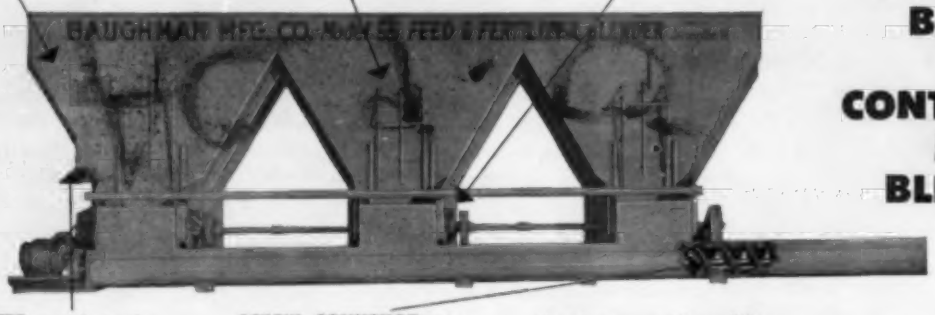
JEFFERSON LAKE SULPHUR COMPANY
General Offices - Whitney Building
NEW ORLEANS, LOUISIANA

SCIENTIFIC *Feed and Fertilizer Blending*... AT NEW LOW COST!

BLENDING CHART indicates proper gate openings for batch being blended.

HOPPER GATE on every hopper has metered rule to assure accurate setting. Mixing and blending of 3 hoppers is simple, accurate!

HAND CLUTCH on each hopper permits use of any combination of hoppers, according to blend.



Baughman

HI-SPEED BATCH OR CONTINUOUS MIX BLENDER

COUNTER records revolutions of hopper conveyor driveshaft. Is preset; stops when amount ordered is reached.

SCREW CONVEYOR at bottom of unit assures uniform blending.

Automatically...

...BLENDS exact proportion of ingredients needed.

...DELIVERS amount needed at approximately one ton per minute, depending on operator and weight of material.

Compact. Place on floor, hook up power. Low installation cost.

WRITE FOR BULLETIN A-402

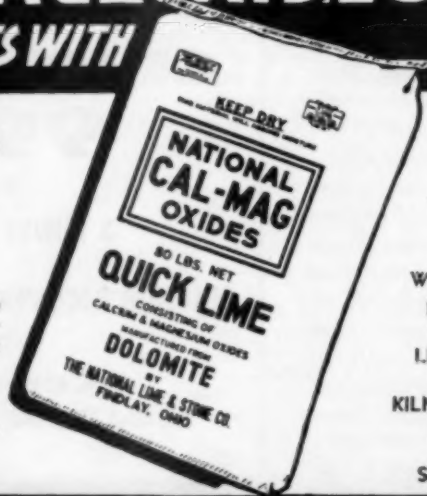
BAUGHMAN

BAUGHMAN MANUFACTURING CO., INC.

132 SHIPMAN ROAD • JERSEYVILLE, ILLINOIS

CAL-MAG OXIDES

CUT YOUR COSTS WITH



CAL-MAG OXIDES

MgO 40.39

CaO 58.07

TNP 203.88

Unexcelled for its superior Dehydrating, Neutralizing, and Curing factors in the preparation of better fertilizers. Write for complete information.

PROMPT SHIPMENTS

Three railroads serve our Carey, Ohio plant—assuring prompt delivery—everywhere.

We Also Produce
DOLOMITIC HYDRATED LIME (165 TNP)
and
KILN DRIED RAW DOLOMITE (107 TNP)
Screened to size

The NATIONAL LIME and STONE CO.
General Offices • • • • • FINDLAY, OHIO

(2) Anon., *Chemical Week*, 72 (12): 32 (1953).
(3) Anon., *Farm Chemicals*, 116 (2): 31-7 (1953).
(4) Anon., *J. Agr. Food Chem.*, 3 (4):297-356 (1955).
(5) Audidier, L. "The Agronomic Efficiency of Granulated Compound Fertilizer," published by author, Paris, 1954.
(6) Clark, K. G., and Hardesty, J. O., *Agricultural Chemicals*, 6 (9):42-6, 113, 115, 117 (1951).
(7) Constant, A., *Farm Chemicals*, 115 (2):27-9 (1952).
(8) Cook, G. W., *Agr.* (England), 62, 27-30 (1955).
(9) Cooke, G. W., *Fert. Soc. (London) Proc.*, 27 (1954).
(10) Cooke, G. W., *Nat. Agr. Advisory Serv. (England) Quarterly Review*, 27, 95-105 (1955).
(11) D'Leny, W., *Fert. Soc. (London) Proc.*, 24 (1953).
(12) Hignett, T. P., *Chem. Eng.*, 58, 166-9 (1951).
(13) Houston, E. C., Hignett, T. P., and Dunn, R. E., *Ind. Eng. Chem.*, 43 2413-8 (1951).
(14) Huang, T. H., Unpublished research and survey reports, 1954, 1955.
(15) Inskeep, G. C., Henry, T. H., *Ind. Eng. Chem.*, 45, 1386-95 (1953).
(16) Jacob, K. D., and Hill, W. L., Chapter X of "Soil and Fertilizer Phosphorus in Crop Nutrition," edited by Pierre, W. H., and Norman, A. G., Academic Press, Inc., New York, 1953.
(17) McMullin, R. B., *FIAT* Report No. 718, 1946.
(18) McKnight, D., Anderson, J. F., Striplin, M. M., and Hignett, T. P., *J. Agr. Food Chem.*, 1(2):162-6 (1953).
(19) Mulder, E. G., *Fert. Soc. (London) Proc.*, 25 (1953).
(20) Nielsson, F. T., and Yates, L. D., *J. Agr. Food Chem.*, 1 (10):672-7 (1953).
(21) Nielsson, F. T., Yates, L. D., Roy, L. F., and Heil, F. G., *J. Agr. Food Chem.*, 1 (17):1050-4 (1953).
(22) Organization for European Economic Co-Operation, "Fertilisers: Methods of Analysis Used In OEEC Countries," published by OEEC, Paris, 1952.
(23) Organization for European Economic Co-Operation, "Fertilizers: Production, Consumption and Trade in OEEC Countries," published by OEEC, Paris, 1954.
(24) Organization for European Economic Co-Operation, "Sulphuric Acid and the Manufacture of Phosphatic Fertilizers," published by OEEC, Paris, 1953.
(25) Plusjé, M. H. R. J., *Fert. Soc. (London) Proc.*, 13 (1951).
(26) Plusjé, M. H. R. J., "Physico-Chemical Investigations on the Treatment of Rock Phosphate with Nitric Acid," the Netherlands State Mines, Galeen, the Netherlands, 1948.
(27) Rogers, H. T., *Agron. J.*, 43, 468-76 (1951).
(28) Rogers, H. T., Pearson, R. W., and Ensminger, L. E., Chapter VII of "Soil and Fertilizer Phosphorus in Crop Nutrition," edited by Pierre, W. H., and Norman, A. G., Academic Press, Inc., New York, 1953.
(29) Rothamsted Reports, *1951, 1952, 1953.*
(30) Stanfield, Z. A., *J. Agr. Food Chem.*, *1* (17), 1054-9 (1953).
(31) Starostka, R. W., and Hill, W. L., Unpublished results.
(32) Striplin, M. M., McKnight, D., and Hignett, T. P., *Ind. Eng. Chem.*, 44, 236-42 (1952).
(33) Thorne, D. W., Johnson, P. E., and Seatz, L. F., *J. Agr. Food. Chem.*, 3 (2):136-40 (1955).
(34) Walthall, J. H., Chapter VII of "Fertilizer Technology and Resources in the United States," edited by Jacob, K. D., Academic Press, Inc., NewYork, 1953.★★

BAIT SPRAYS

(*From Page 34*)

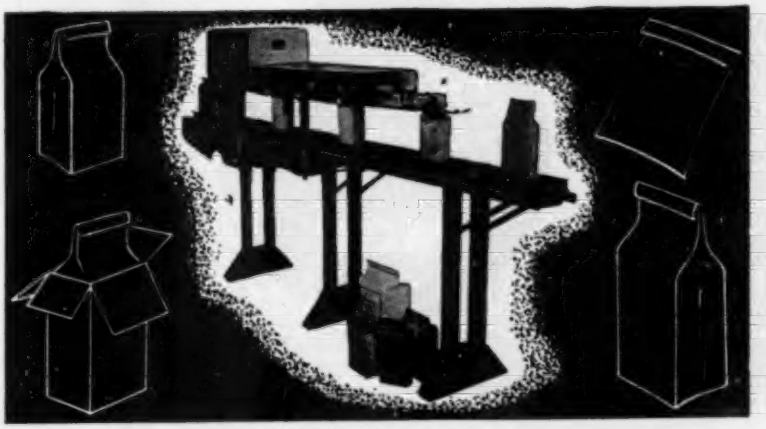
malathion wettable powder per acre, to cause complete cessation of immature fruit drop, and rapid attainment of full production (Steiner 1955). The number of fruit flies killed in one vineyard sprayed weekly, averaged 2,500 per acre per day for the 3-month duration of the experiment.

Gravid females respond to bait-spray deposits as readily as newly emerged flies. Honeydew-secreting insects, such as green scale on guava, may compete with these deposits to reduce the efficiency as much as 45 per cent. Contamination of the honeydew or its microflora with the toxicant, or destruction of the insects that produce it, adds to bait-spray performance. Fruit flies appear to have strong instinct to search host foliage for attractive odors. Bait sprays applied to artificial or fruit surfaces more than a few inches from the nearest leaves are ineffective. If leaves containing bait-spray deposits wilt, attractiveness ceases.

Methyl Eugenol Baits

ISOLATED infestations of the oriental fruit fly may be controlled by destruction of the males before they fertilize females, through use of a powerful lure on poisoned feeding

FRY BAG CLOSING MACHINE



Makes Sift-Proof Seals in Heavy Weight Paper Bags

Fry Model CSG automatically makes a double folded sift-proof heat seal in the top of any heavy weight paper bag. The first fold is securely heat sealed; the second is glued for extra safety.

Bags handled include polyethylene and pliofilm lined, polyethylene coated and those with thermoplastic top sealing bands. Simple adjustments for bags of various heights. This model also handles bags which are not heatsealable by gluing the folds.

Machine above is perfect for granular or fine products such as insecticides, chemicals, powdered paints, fertilizers, dog foods, etc.

Other models available . . . when writing, please submit a sample of your bag and your product.

GEORGE H. FRY COMPANY
42 East 2nd St.
Mineola, L. I., N. Y.
GArden City 7-6230

There's Real Money in
BAGGED MANURE

REPRESENTATIVES, DISTRIBUTORS . . .
Get Complete Details TODAY!

There's a demand for bagged Cow or Sheep Manure the year round. Lebanon's unlimited supply guarantees steady profits. Mixed carloads of this thoroughly dehydrated Cow or Sheep Manure solve storage problems.

It's sterilized, weed free, free of straw and it's all organic. Bagged in popular colorful 10 lb., 25 lb., and 50 lb. leakproof, multi-wall bags. Contracts will be shipped as you specify. Private brand labels supplied on contract orders.

TOP DISCOUNTS. Write today for full details and cash in as a representative or distributor for these brand named products.

LEBANON

Shipped direct F.O.B. from plant in Southwest

Lebanon CHEMICAL CORPORATION, LEBANON, PA.

OLDBURY
1896 ®

Quality...Uniformity...
Technical service

SODIUM CHLORATE

when you specify

OLDBURY
ELECTRO-CHEMICAL COMPANY

Executive Offices: NIAGARA FALLS, NEW YORK
Sales Office: 19 RECTOR STREET, NEW YORK 6, N. Y.
Plants: NIAGARA FALLS, N.Y. COLUMBUS, MISS.

Pyrethrum?
Allethrin?
ask
MGK

As acknowledged pioneers and recognized authorities in the correct use of pyrethrum, allethrin and their most effective synergists, MGK 264 and piperonyl butoxide, we offer standardized concentrates, extracts, dusts of guaranteed uniformity.

If your aerosols, sprays, or dusts include the use of the powerful, safe and spectacular knockdown agents, pyrethrum and allethrin, send your inquiry today. All requests for information answered by qualified authorities. Write.

McLAUGHLIN GORMLEY KING Company

1711 S.E. Fifth Street • Minneapolis, Minnesota

WISCONSIN ALUMNI RESEARCH FOUNDATION

LABORATORY SERVICES

Peet-Grady and C.S.M.A. aerosol tests
Biological evaluation of insecticides
Screening of compounds for insecticidal, fungicidal, and bactericidal properties
Bioassay of insecticide residues on crops
Chemical determination of insecticides
Phenol coefficient determinations
Mineral determinations including fluorine and other trace elements
Pharmacology including warm-blooded toxicity studies
Warfarin assays — physico-chemical and biological
Other biological, chemical, and microbiological services

PROJECT RESEARCH AND CONSULTATION

Write for Price Schedule

WISCONSIN ALUMNI RESEARCH FOUNDATION

P.O. Box 2059-B • Madison 1, Wisconsin

stations, as demonstrated in Hawaii by Steiner and Lee (1955). Methyl eugenol was found attractive only to males of this species, but proved as powerful as any insect attractant known. When Pyrolan, at 3 per cent, was dissolved in the methyl eugenol, and 30 to 50 ml. of this solution applied at monthly intervals to small cane-fiber feeding stations distributed at the rate of 30 to 40 per square mile, 60 to 100 per cent control was obtained in most of a 6-square-mile area that was treated for 16 months at a cost of less than 35 cents per acre. DDVP has also been found effective for similar use with the methyl eugenol bait. The formula can be used as a spray, but better results were obtained by applying it to porous surfaces. However, it was not found practical for use in small areas continuously reinfested by fertile females from outside. Because it can attract male oriental fruit flies ½ mile or more away in 15 minutes, methyl eugenol is also outstanding as an acid in scouting for this pest. Despite intensive research, no lure remotely approaching the attraction of methyl eugenol to the oriental fruit fly male has been found for the melon fly or the Mediterranean fruit fly.

Summary

POISON-bait sprays that utilize a quick-acting organic phosphorus insecticide, such as malathion, in combination with certain acid or enzymatic protein hydrolysates have been developed in Hawaii for the control of the oriental fruit fly, the melon fly, and the Mediterranean fruit fly. Recent studies in Mexico have also found them to be effective in control of the Mexican fruit fly.

With such sprays, better control has been obtained with less insecticide than with conventional sprays, resulting in reduced costs, reduced hazards to fruit pickers, spraymen, and consumers, and very little destruction of parasites, predators, and pollinating insects. Biweekly applications of 4 pounds of 25 per cent malathion wettable powder and 1 pound of protein hydrolysate per acre in from 5 to 150 gallons of water have generally been found adequate for heavy infestations. Dilute and concentrated sprays gave equal results. The flies could not be lured to deposits on artificial surfaces or dead foliage. Females were attracted and killed in greater numbers than males. Fresh applications attracted and killed flies from adjacent unsprayed areas, and thus reduced subsequent invasion by gravid females. The spray deposits attracted and killed flies for as long as 2 to 3 weeks.

Most of the currently used fungicides destroyed or reduced the effectiveness of the sprays when mixed together. However, some fungicide sprays can be applied prior to bait sprays.

Another means of controlling the oriental fruit fly was developed for use against isolated infestations. A 3 per cent solution of Pyrolan in methyl eugenol attracted male flies from ½ mile or more, and by killing them reduced fertilization of females. Cane-fiber board feeding stations were impregnated monthly, and distributed at the rate of 30 to 40 per square mile, at a cost of 35 cents per acre for a 16-month period. A similar solution of DDVP in methyl eugenol was also effective.

Literature Cited

Finney, Glenn L. 1953. A summary report on the mass-culture of fruit flies and their parasites in Hawaii. Joint Legislative Committee on Agriculture and Livestock Problems. Special Report on the Oriental Fruit Fly. Published by Senate of State of California, pp. 77-83.

Hagen, Kenneth S. 1953. Influence of adult nutrition upon the reproduction of three fruit fly species. Joint Legislative Committee on Agriculture and Livestock Problems. Special Report on Oriental Fruit Fly. Published by Senate of State of California, pp. 72-76.

Shaw, J. G. 1955. Poison-lure sprays for Mexican fruit fly. Calif. Citrograph. 40 (5): 188-192.

Steiner, L. F. 1952. Fruit fly control in Hawaii with poison-bait sprays containing protein hydrolysates. *Jour. Econ. Ent.* 45 (5): 838-843.

Steiner, L. F. 1954. Fruit fly control with poisoned-bait sprays in Hawaii. ARS-33-3, pp. 4.

Steiner, L. F. 1955. Fruit fly control with bait sprays in relation to passion fruit production. *Proc. Hawaii. Ent. Soc.* 15 (3): 601-607.

Steiner, L. F., and R. K. S. Lee. 1955. Large-area tests of a male-annihilation method for oriental fruit fly control. *Jour. Econ. Ent.* 48 (3): 311-317.★★

PYROPHYLLITE

the ideal Diluent and Extender for INSECTICIDES

Insecticide Grade Pyrophyllite adsorbs rather than absorbs. This produces greater toxic effect for your agricultural poison.

Ask For Our Pamphlet

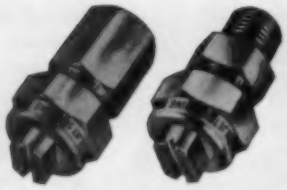
GLENDON PYROPHYLLITE COMPANY

P. O. Box 2414, Greensboro, N. C. Plant and Mines at Glendon, N. C.

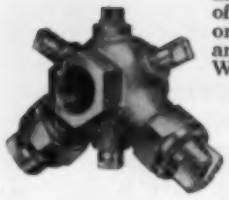
Formerly Glendon Div., Carolina Pyrophyllite Co.

for precision

TeeJet®



World famous nozzles for boom and portable sprayers. Choice of over 400 interchangeable orifice tips in flat spray, cone and straight stream types. Write for Bulletin 58.



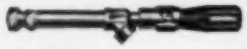
for broadcasting

BoomJet®

Spray up to 66 feet wide with one assembly. For spraying grains, grasses and liquid fertilizers. Write for Bulletins 66 and 71.

for gun spraying

GunJet®



Adjustable spray for pressures up to 800 lbs. Write for Bulletins 65 and 69.

SPRAYING SYSTEMS CO.
3230 Randolph Street • Bellwood, Illinois

WORLD'S LARGEST STOCK

UNION Rebuilt Machinery Established 1912

REBUILT & GUARANTEED MACHINERY AT GREAT SAVINGS

Mitts & Merrill 15 CD Heavy Duty Crusher.
J. H. Day Dry Powder Mixers, 50 to 10,000 lbs. cap.
Rosina S and LC Automatic Cappers.
Gemco 2000 lb. Double Cone Blender.
Burt Wraparound Labelers, up to 1 gal. cap.
Mikro 2TH, 1SH, 1F, Bantam Pulverizers.
Day 650 gal. Steam Jacketed Jumbo Mixer.
Day, Robinson, Rotex, Tyler Hum-mer, Raymond, Great Western, Gayco Sifters.
Stokes and Smith B Auger Transwrap.
Stokes and Smith G1, G6, HG88 Duplex Auger Fillers.
Plaudler, Horix, Elgin, MRM Stainless Steel Fillers.
Pony, Ermold, World Semi and Fully Auto. Labelers.
Package Machinery FA, FAQ, FA2 Auto. Wrappers.
Hayssen, Scandia, Miller, Campbell, Oliver Wrappers.
IMMEDIATE DELIVERIES

Write, Wire, Phone Collect for Details and Prices

UNION STANDARD EQUIPMENT CO.
318-322 Lafayette St. New York 12, N. Y.

Montrose Chemical Corp. of California

Now offers in Commercial Quantities

DDT
Krisp Chips

A new physical form of DDT with these advantages

Good Grindability
Excellent Solubility
Low Price

DDT KRISP CHIPS in form are between the lump and flake. They are highly recommended for either dust or liquid solutions.

For prices and samples, write to

R. W. GREEFF & Co., Inc.
10 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.
TRIBUNE TOWER, CHICAGO 11, ILL.

TYPE-41
KAOLIN CLAY

For Use in Extending Insecticidal Materials

- Non-Abrasive
- Small Particle Size
- Chemically Adaptable
- Good Adhesive Qualities

For information and samples, write:

SOUTHEASTERN CLAY COMPANY
AIKEN, SOUTH CAROLINA

Classified ADVERTISING

Rates for classified advertisments are ten cents per word, $2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, $1.00 minimum. Address all replies to Classified Advertisements with Box Number, care of AGRICULTURAL CHEMICALS, P. O. Box 31, Caldwell, N. J. Closing date: 10th of preceding month.

Situations Wanted:

AGRICULTURIST: Field and greenhouse testing, also formulation of pesticides. Chemistry, agronomy and botany background. Prefers sales development or technical service. Traveled widely. Address Box 982, c/o **Agricultural Chemicals.**

MANUFACTURERS' Representative, chemist, in Topeka, Kansas desires agricultural chemicals account. Address Box 983, c/o **Agricultural Chemicals.**

Help Wanted:

SALES MANAGER WANTED: West Coast anhydrous ammonia distributor has an opening for qualified man with sales experience in the direct application of NH_3. Excellent opportunity for young, aggressive sales manager. Please state education and experience in replying. Please enclose a recent photo. Address Box 978, c/o **Agricultural Chemicals.**

TECHNICAL SUPERVISOR: Established chemical company with national distribution desires technical personnel such as chemist or entomologist experienced in formulation and application of agricultural chemicals, preferably age 25-35, for Technical Supervisor in Southern region, involving field testing, product quality controls, label preparation. Address Box 985, c/o **Agricultural Chemicals.**

WANTED: Rapidly growing pesticide specialty company requires technically trained man for general administrative work, sales correspondence and inside technical service. An unusual opportunity for responsible, stable person. Reply in detail stating salary desired. Address Box 979, c/o **Agricultural Chemicals.**

NEW PETROCHEMICAL COMPANY
Now in Agricultural Chemicals

We are seeking an ambitious, energetic individual who wants to grow with us. He should:

Have a strong background on ammoniating and bulk plant mixing technology.

Be a Chemical Engineer or equivalent well acquainted in Southeastern States.

Be able to supply technical advice and accompany sales personnel on customer contacts.

Be qualified as a company representative meeting State and University Agricultural organizations.

Please furnish complete resume of personal data, education and experience to: Box 984 c/o **Agricultural Chemicals.**

For Sale:

FERTILIZER BUSINESS—located in one of the very best irrigated farm communities in entire state of South Dakota. It will pay you to investigate this business. Information and free pictures mailed, no obligation whatsoever on your part. C-5789 Continental, 804 Grand Ave., Kansas City, Missouri.

FOR SALE: (2) 14,000 gal. Horizontal Glass Lined Tanks; (4) 15,000 gal. vertical welded steel tanks with coils. Can furnish agitators and drives. (12) 3,000 gal. horiz. aluminum tanks. (4) Rotary kilns and dryers. 10′6″ x 105′, 5′ x 30′, 4′6″ x 40′, 3′ x 25′. Also Powder Mixers, Hammer Mills, Pulverizers, screw conveyor, bucket elevators, etc. Perry Equipment Corp., 1428 N. 6th St., Phila. 22, Pa.

FERTILIZER MIXING PLANT: Located in best agricultural section of N. C. Showing good profit on $180,000.00 gross and still growing. Would require a minimum of $25,000.00 cash. This is an excellent opportunity for a man to get in business for himself and make good money from the start. Address Box 980, c/o **Agricultural Chemicals.**

FOR SALE: Agricultural Chemical formulating plant completely equipped for processing of liquid insecticides, dust mixes and concentrates, 2,4-D and 2,4,5-T esterification. Located at Denver, Colorado. Current volume approximately $300,000.00 per year. Can very easily be doubled. Priced for quick sale at depreciated book value. Address Box 981, c/o **Agricultural Chemicals.**

WHOLESALE AGRICULTURAL CHEMICAL BUSINESS FOR SALE

We are located in a good trade area in one of the Middle Atlantic states, and have jobber franchises with practically all of the major manufacturers. Our sales over the past three years have averaged more than $100,000 annually: our customers include hardware stores, implement dealers, custom sprayers, institutions, etc. inside a 100-mile radius. For the off-season we have also developed a profitable business in janitor's supplies and sanitary chemicals. Our inventory consists of approximately $20,000 in clean, salable merchandise and equipment, and we own a modern concrete block building with 4,000 sq. ft. of office and warehouse space. Facilities include small-batch mixing equipment for dusts and liquids. The property includes plenty of room for expansion in a fast-growing small city, where living conditions are excellent.

The owners have other interests and cannot devote the necessary time to this business. We will sell the entire business—land, building, inventory, good will and dealer accounts for $40,000. Cash required $20,000, balance can be paid out of earnings. This is an excellent opportunity for one or two men with a knowledge of the agricultural field to get started in a business of their own. Please do not reply unless you are seriously interested and can qualify financially.

Address Box 977, c/o **Agricultural Chemicals**

ALVIN J. COX, Ph.D.
Chemical Engineer and Chemist

(Formerly Director of Science, Government of the Philippine Islands. Retired Chief, Bureau of Chemistry, State of California, Department of Agriculture.)

ADVISER ON AGRICULTURAL CHEMICAL PROBLEMS AND INVESTIGATIONS

Consultant in reference to spray injury and damage, claims, including imports of fruits and nuts, formulas, labeling, advertising and compliance with law.

1118 Emerson Street
Palo Alto, California

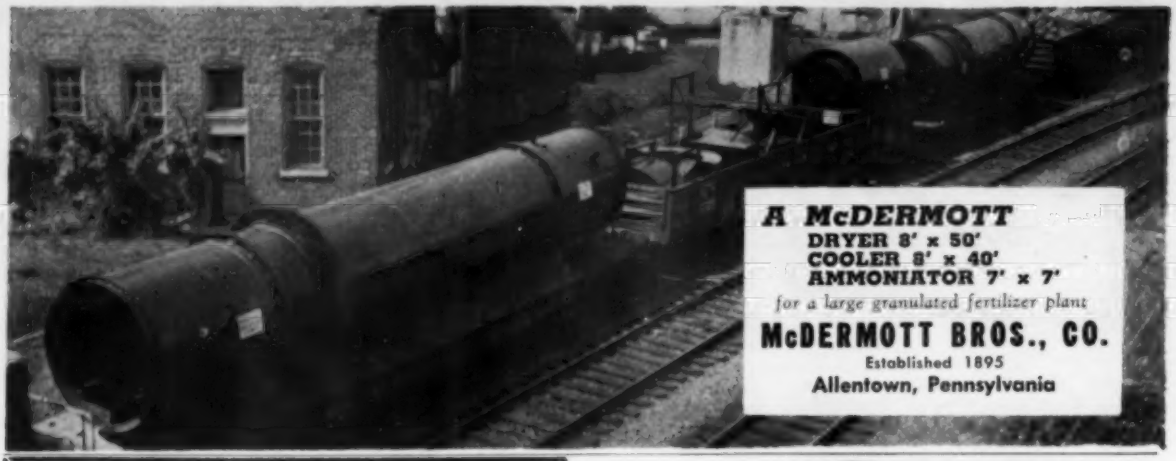
MOntclair 3-2598

DONALD F. STARR, PH.D.
CONSULTING CHEMIST

256 NORTH MOUNTAIN AVE.
UPPER MONTCLAIR, N. J.

Insecticides
Aerosols-Rodenticides

Fish Control **Agricultural Chemicals**



A McDERMOTT
DRYER 8' x 50'
COOLER 8' x 40'
AMMONIATOR 7' x 7'
for a large granulated fertilizer plant
McDERMOTT BROS., CO.
Established 1895
Allentown, Pennsylvania

Lancaster, Allwine & Rommel
Registered Patent Attorneys
Suite 428,
815—15th STREET, N. W.
Washington 5, D. C.

Patent Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions.

Booklet and form "Evidence of Conception" forwarded upon request.

FOR THE FINEST VACATION EVER!

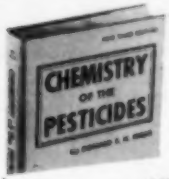
AAA
Sunny Isles
MOTEL
ON THE OCEAN at 163rd Street
BEST VACATION BUY

Now you can stay in America's finest vacationland at these LOW prices! Fun for everyone—Private beach and pool—Wading Pool and Playground for children—Completely Air-Conditioned. Finest facilities and accommodations.

MINIMUM RATE
$3 per person double

Write Today for Reservations

Miami Beach
16525 Collins Avenue, Miami Beach 41, Florida



CHEMISTRY OF THE PESTICIDES
NEW THIRD EDITION by
Donald E. H. Frear
Detailed up-to-date information on the insecticides, fungicides, herbicides and rodenticides in use today; their chemical nature, properties, production, applications, reactions, with extensive references on each substance.
492 pages, Illus., $8.25
ORDER FROM
AGRICULTURAL CHEMICALS
CALDWELL • NEW JERSEY

"COHUTTA"
POWDERED TALC
An excellent carrier for insecticides and fungicides. Produced by
Cohutta Talc Co.
Dalton - - - Georgia

Theodore Riedeburg Associates

Sales Consultants

and

Manufacturers' Representatives

on

Agricultural Chemicals

415 Lexington Ave.
New York 17, New York
MU rray Hill 7-1488

FORMULATING SERVICE

Single Batch Processing From Lab Size To Carload Quantities
(from your raw materials or ours)

MACHINE FILLING AND LABELLING

Complete Warehouse Service Available
also
Tankcar Shipments Stored and Packaged

We Do Not Distribute — Our Business Is *"Custom Formulation"*

LORENZ CHEMICAL CO.

17th & Nicholas, Omaha 2, Nebr.

Serving the Nation from a Central Location

SOIL & PLANT TESTS

SOIL FERTILITY PROBLEMS

EVALUATION OF AGRICULTURAL CHEMICALS

Dr. Wolf's Agricultural Laboratories
2620 Taylor St. Hollywood, Fla.

LOOKING FOR A MAN?

Use Agricultural Chemicals as the most logical medium to reach the very person you seek. Classified advertisements are read widely.

Want a good man? . . . or a good job?

Have you something to sell?

Looking for something to buy? . . .

Run classified ad in the largest classified section for the agricultural chemicals industry . . . in the pages of AGRICULTURAL CHEMICALS MAGAZINE.

Rates are low . . . results are fast, because you reach the market you are interested in.

You can read about the home town in the local newspapers . . . but if you want to keep up on what's going on in the agricultural chemicals industry . . . and keep up on new developments in the trade you'd better keep your copies of "Agricultural Chmicals" coming.

If you aren't on the ball, and are not a subscriber, better send in your order now to: Agricultural Chemicals, P. O. Box 31, Caldwell, New Jersey.

Result of 1954 FUNGICIDE TESTS

This summary of results on fungicide tests by 75 collaborating pathologists is compiled in a 16-page report of the 1954 tests. Order the booklet at $1.00 per copy directly from:

W. D. MILL
College of Agriculture
Ithaca, New York

1955

Official Publication

ASSOCIATION OF AMERICAN FERTILIZER CONTROL OFFICIALS

Reports of committees, investigators, officers, technical reports, list of fertilizer control officials, etc.

96 pages, $1.00

Write direct to:

AAFCO

c/o B. D. Cloaninger
Clemson Agricultural College
Clemson, S. C.

AC on Microfilm

All issues of AGRICULTURAL CHEMICALS are available on Microfilm.

Librarians and other interested subscribers can contact University Microfilms, 13 North First Street, Ann Arbor, Mich., for price information and copies.

DON'T TAKE CHANCES

with toxic insecticides and fumigants such as Systox, Parathion, TEPP, Aldrin, Chlordane, etc.

WILLSON AGRI-TOX RESPIRATOR

USDA accepted Willson Agri-Tox is the universal respirator for handling and applying toxic farm chemicals. Write for bulletin, prices and name of your nearest distributor.

WILLSON®

Leaders in Research and Development of Safety Equipment Since 1870

116 Thorn Street, Reading, Pennsylvania

HANDBOOK OF AGRICULTURAL PEST CONTROL

by

S. F. Bailey and L. M. Smith

CONTENTS

The Commercial Agricultural Chemicals
Physical and Chemical Properties
Compatibility
Containers
Fumigants and Fumigation
Toxicology and Residues
Spray Oils and their Properties
Spraying Machines
Rates of Delivery of Spray Machines
Rates of Application for Sprays
Dusts and Dusting
Aircraft
Mosquito Control
Hazards
Miscellaneous Topics
Tables and Formulas
Terms and Symbols

184 PAGES $3.25 in U. S. A.

Send check with order

INDUSTRY PUBLICATIONS, Inc.

P.O. Box 31 Caldwell, N. J.

Practical Books For Your Library . . .

Soils and Soil Fertility

by L. M. Thompson

336 pages, $5.00—This authoritative treatment begins by telling what soil is—what makes it up physically, chemically, biologically—and what its moisture-holding characteristics are. The use of commercial fertilizers and farm manure are other subjects under discussion.

Chemistry and Uses of Insecticides

by E. R. de Ong

445 pages, $6.75—This book covers all the major insecticidal agents in detail, describing not only their chemical nature and properties, but also their specific action on various types of insects, their methods of application, and their effect on animals and humans.

Phosphates in Agriculture

by Vincent Sauchelli

175 pages, $2.75—It deals with the subject of rock phosphate versus superphosphate and colloidal phosphate; with the origin of phosphorus, the mining and processing of the phosphate rock, granulation of superphosphates, fixation of phosphates in the soil, losses of phosphorus and replenishments, phosphorus in nutrition, radioactive phosphorus, basic slag, fused and sintered phosphates and TVA research data on phosphates from field tests in 13 states.

Manual on Fertilizer Manufacture

Second and Enlarged Edition
by Vincent Sauchelli

$4.75—Complete volume on superphosphate and mixed fertilizer manufacture for the use of the operating men in the fertilizer works.

The Care and Feeding of Garden Plants

370 pages, $3.00—Written by 14 leading specialists in plant nutrition, this profusely illustrated volume tells how to grow more plump, juicy vegetables, a finer lawn, healthier shade and fruit trees, more colorful garden flowers and house plants.

Books Sent Postpaid if Check is Enclosed with Order

Handbook of Agricultural Pest Control

by S. F. Bailey and L. M. Smith

190 pages, $3.25—A practical handbook for the custom spray operator, the pest control operator, farm advisor, agricultural chemical salesman and field worker. This handbook covers the agricultural chemicals (insecticides, fungicides, herbicides, plant hormones and nutrient sprays, defoliant, etc.), their rates of application, useful formulas, as well as chapters on fumigation, spray machines, toxicology, dusts and dusting, aircraft, and mosquito control.

Insect Control by Chemicals

by A. W. A. Brown

817 pages, $12.50—This text classifies the insecticides and gives their chemical, physical properties; discusses the hazards to avoid in formulation, mixing and use of compounds; and illustrates modern application equipment.

The Chemistry and Action of Insecticides

by H. E. Shephard

504 pages, $7.00—This new book gives a vast wealth of information on insecticides—their chemical, physical, and toxicological aspects. Covers these chemical groups: Arsenical Compounds; Fluorine Compounds, Sulphur Compounds; Copper Compounds; Inorganic Substances; Nicotine; Rotenone; Petroleum, Soaps, Creosotes; Synthetic Organic Insecticides.

Destructive and Useful Insects Their Habits and Control

by C. L. Metcalf and W. P. Flint

1071 pages, $10.00—This authoritative guidebook covers hundreds of both useful and destructive insects—treating the inner and outer structure and form of general species. Here are descriptions of more than 500 types of insect pests of the U. S. and Southern Canada.

Insect Resistance in Crop Plants

by Dr. Reginald H. Painter

520 page, $9.80—Here is a complete analysis of the relationship between crops and phytophagous insects together with a full analysis of the insect resistant varieties of important crops, such as wheat, corn, cotton, sorghums, potato.

Weed Control

by W. W. Robbins, A. C. Crafts, and R. N. Rayner

543 pages, $8.00—Here is an authoritative, thorough book. Based on experience, research and experiment, it shows what methods of weed control have proved most effective for weeds of all species—shows how and when to apply a control measure, the season and rate of application, dosage, etc., and outlines the materials and machinery needed.

Soils and Fertilizers

by F. E. Bear

375 pages, $6.00—This text presents the basic scientific facts and principles behind the production and utilization of agricultural chemicals.

Agricultural Chemicals
P. O. Box 31, Caldwell, N. J.

Enclosed is payment. Please send the books checked.

- ☐ **Handbook of Agricultural Pest Control — $3.25**
- ☐ **Insect Control by Chemistry — $12.50**
- ☐ **Chemistry and Action of Insecticides—$7.00**
- ☐ **Destructive and Useful Insects. Their Habits and Control—$10.00**
- ☐ **Insect Resistance in Crop Plants—$9.80**
- ☐ **Weed Control—$8.00**
- ☐ **Soils and Fertilizers—$6.00**
- ☐ **Soils and Soil Fertility — $5.00**
- ☐ **Chemistry and Uses of Insecticides — $6.75**
- ☐ **Phosphates in Agriculture—$2.75**
- ☐ **Manual on Fertilizer Manufacture — $4.75**
- ☐ **The Care and Feeding of Garden Plants—$3.00**

***All prices above are in U.S.A. only — Add 50¢ for Foreign.**

Name .....

Address .....

City, Zone & State .....

Index to ADVERTISERS

Abrasion & Corrosion Engineering Co.....Oct.
American Agricultural Chemical Co.....Oct.
American Cyanamid Co. 30
American Potash & Chemical Corp..... 50
Andrews, W. R. E. Sales, Inc. 99
Antara Chemical Div., General Dyestuff Corp. 19
Armour and Co. 77
Ashcraft-Wilkinson Co. 6, 25
Atlantic Refining Co. 22
Atlas Powder Co. 86

Bagpak Div., International Paper Co.....Sept.
Baughman Mfg. Co. 112
Bell Clay Co. .....Oct.
Bemis Bro. Bag Co. 26
Berkshire Chemicals, Inc. 100
Blue Valley Engr. & Equip. Mfg. Co. 102
Bowser, Inc. .....Sept.
Bradley & Baker .....3rd Cover
Bradley Pulverizer Co. 89
Burlap Counsel of the Indian Jute Mills Ass'n. .....Oct.

California Spray Chem. Co. 90
Carbide & Carbon Chemicals Co. 29
Chemagro Corp. 66
Chemical Construction Corp. 15
Chemical Service Corp. 110
Climax Molybdenum Co. 54
Cohutta Talc Co. 118
Commercial Solvents Corp. .....Sept.
Combustion Engineering, Inc., Raymond Division 23
Continental Can Co., Shellmar Betner Div. .....Oct.
Cox, Dr. Alvin J. 117

Davies Nitrate Co., Inc. .....Oct.
Davison Chemical Co., Div. of W. R. Grace & Co. .....Oct.
Deere & Co., Grand River Chem. Div. ....Oct.
Diamond Alkali Co. 92
Dorr-Oliver Co. 16
Dow Chemical Co. 110
Duval Sulphur & Potash Co. 6

Eagle-Picher Co. 110
Emulsol Corp. .....Sept.
Escambia Bay Chem. Corp. 25
Exact Weight Scale Co. 101

Fairfield Chemical Div., Food Machinery & Chemical Co. 16
Floridin Co. .....Sept.
Fluor Corp. .....Oct.
Fresno Chamber of Commerce .....between 18 & 19
Fry Co., Geo. H. 113
Fulton Bag & Cotton Mills 21

Geigy Chemical Co. .....Sept.
General American Transportation Corp. 8
Glendon Pyrophyllite Co. 115
Grace Chemical Co. .....Sept.
Grand River Chemical Division of Deere & Co. .....Oct.
Greeff & Co., R. W. 116

Hammond Bag & Paper Co. 10
Hardinge Co. .....Oct.
Heckathorn & Co. .....Sept.
Hercules Powder Co. .....4th Cover
Huber, J. M. Corp. .....Sept.
Hudson Pulp & Paper Corp. .....Oct.

International Minerals & Chemical Corp. 12, 13, 27

Jefferson Lake Sulphur Co. 111
Johns-Manville Co. 14
Johnson, C. S. & Co. 106

Koppers Co. .....Oct.
Kraft Bag Co. .....Oct.

Lancaster, Allwine & Rommel 118
Lebanon Chemical Corp. 114
Lion Oil Co. 74
Ludlow-Saylor Wire Cloth Co. .....Oct.

McLaughlin Gormley King Co. 114
McDermott Bros. Co. 118
Michigan Chemical Corp. 85
Minerals & Chemicals Corp. of America 4, 20

National Lime & Stone Co. 112
Naugatuck Chemical Division, U. S. Rubber Co. 108
Neville Chemical Co. 24
Niagara Chemical Div., Food Machinery & Chem. Co. .....Sept.
Ninol Laboratories, Inc. .....Oct.
Nitrogen Div., Allied Chem. & Dye Corp. 9

Oldbury Electro Chemical Co. 114
Olin Mathieson Chemical Corp. ....2nd Cover

Pacific Coast Borax Co. .....Sept.
Penick, S. B. & Co. .....Sept.
Pennsylvania Industrial Chemical Corp...Sept.
Pennsylvania Salt Manufacturing Co..... 80
Phelps Dodge Refining Corp. 104
Phillips Chemical Co. .....Oct.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div. .....Sept.
Potash Company of America 3
Poulsen Co. .....Oct.
Powell, John & Co. .....2nd Cover
Prentiss Drug & Chemical Co. .....Sept.
Private Brands, Inc. 109

Raymond Bag Co. 7
Raymond Division, Combustion Engineering, Inc. 23
Republic Steel Corp. .....Oct.
Renneburg & Sons Co., Edw. 107
Reideburg, Theodore Associates 119
Richfield Oil Co. .....Sept.
Rohm & Haas Co. 62

Shell Chemical Co. .....Sept.
Sohio Chemical Co. 18
Southeastern Clay Co. 116
Spencer Chemical Co. 17
Spraying Systems Co. 116
Squibb Taylor Inc. .....Oct.
St. Regis Paper Co. .....Oct.
Stauffer Chemical Co. 78
Sturtevant Mill Corp. 28
Summit Mining Corp. .....Sept.

Tennessee Corp. 82
Texas Gulf Sulphur Co. .....Oct.
Townsend, Dr. G. R. 119

Union Bag & Paper Corp. 59
Union Special Machine Co. .....Oct.
Union Standard Equipment Co. 116
U. S. Phosphoric Products, Div., Tennessee Corp. .....3rd Cover
U. S. Potash Co. 68
U. S. Steel Corp. .....Sept.

Vanderbilt Co., R. T. 103
Vulcan Stamping & Mfg. Co. .....Sept.
Vulcan Steel Container Co. .....Sept.

Williams Patent Crusher & Pulverizer Co. 11
Willson Products, Inc. 119
Wisconsin Alumni, Research Foundation.. 114
Woodward & Dickerson, Inc. 98

Young Machinery Co. 101

Zonolite Co. 95

Tale Ends

THE fall convention season is in full swing. The Fertilizer Round Table in Washington in early October, followed by the control officials in the same area, then on to Ste. Adele for the Canadian Ag Chemical Assn. And thence to Ithaca, Baltimore, Cincinnati, Memphis. It's getting so it scarcely pays to unpack anymore.

AC

Entomologists planning to attend the Memphis session are counseled to bring along their boxing gloves. For there we anticipate further discussion of the current topic of the hour—"The Boll Weevil —Is it or Ain't It Resistant?" And with cotton belt tempers rising, it could end up in one of those grim early morning meetings, suh, with cotton bolls at fifteen paces.

AC

Are our faces red? After a reasonably good record over recent months, we recently had to reopen our Department of Profuse Apologies—and try to explain to Grub Leonard, and to the folks at Shell, how we listed him in our October NACA meeting story as being with Shell, and not, as the fact is, a recent retiree from Va. Carolina Chem. Corp. What happened was that another well known Leonard, Shell's Mort Leonard, was at the meeting too. Sorry!

AC

The silver star with three palms goes to Hercules Powder for the newest, and best looking reception room in the trade—and the one best designed to make a hit with callers. To start with it's all done in bamboo, like Trader Vic's, and it wouldn't surprise you a bit to have the attractive receptionist hand you a rum drink in a coconut shell. To top the whole deal off, there is a television set, should you be kept waiting, which you aren't. Must have been a popular spot during World Series days.

AC

A fisherman's dream, which consists of a funnel-shaped fish collector with an attached cannery, fertilizer plant and plankton extracting unit is described in a new patent application (#2,718,083) *filed by Hugo Gernsback of New York. Colored lights and mirrors at the fish collecting end of the funnel attract the fish and plankton, which are conveyed to shore by water pipeline and promptly popped into the fertilizer plant.*

AC

And, speaking of inventions, remember the "Wonsover" described in May and July issues of Ag Chem? A ten-ton "Rube Goldberg" style farm machine which plows, harrows, fertilizes, seeds, applies insecticide and fumigates with equal facility and practically simultaneously. The staid and respectable old *Wall Street Journal* which hasn't made a mistake since who knows when reported last month that W. R. Grace & Co. would buy fifty of the machines to be shipped to South America for use there on pineapple, cotton and sugar cane planting. Just to prove anyone can make a mistake, the story was "nixed" a day later, with the note that "we haven't bought at present . . . though we're still interested . . . if the developers of the machine can adapt it to our special needs."

Where's My Interference?

SENDING your salesmen out after orders without clearing some of the obstacles out of their path with a well-planned advertising program is just like sending a half back around end with no interference.

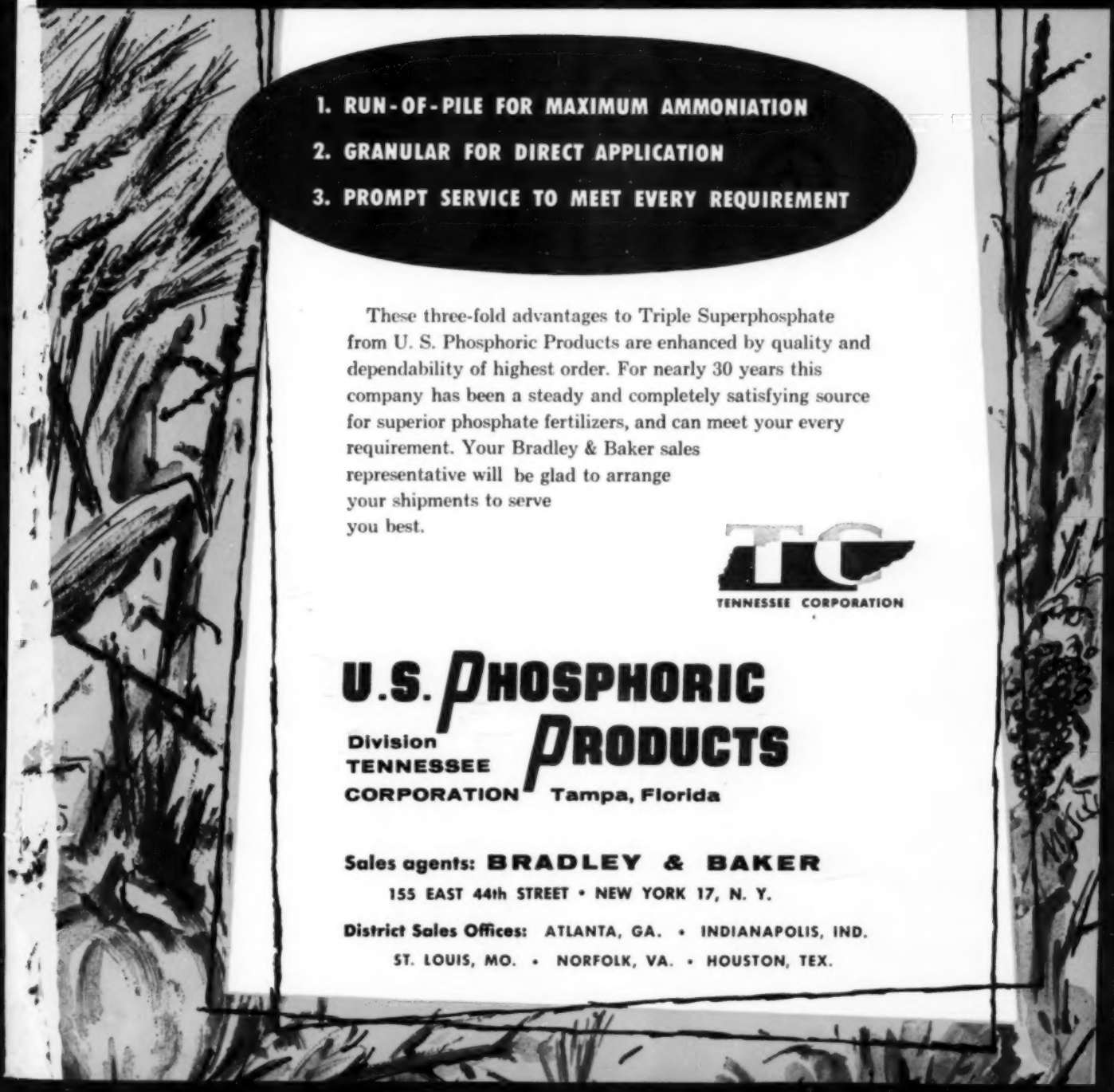
If it's in the field of agricultural insecticides, fertilizers, herbicides, etc., that you're looking to make a few touch downs in the '56 season, try some pre-season advertising now to prepare the way. Don't let those fleet salesmen get all banged up with no interference. And the spot for that advertising program, if you want top results, is in the top magazine—

AGRICULTURAL CHEMICALS

Caldwell **New Jersey**

Member Audit Bureau of Circulations

TRIPLE SUPER-PHOSPHATE



1. RUN-OF-PILE FOR MAXIMUM AMMONIATION
2. GRANULAR FOR DIRECT APPLICATION
3. PROMPT SERVICE TO MEET EVERY REQUIREMENT

These three-fold advantages to Triple Superphosphate from U. S. Phosphoric Products are enhanced by quality and dependability of highest order. For nearly 30 years this company has been a steady and completely satisfying source for superior phosphate fertilizers, and can meet your every requirement. Your Bradley & Baker sales representative will be glad to arrange your shipments to serve you best.

TENNESSEE CORPORATION

U.S. PHOSPHORIC PRODUCTS

Division TENNESSEE CORPORATION Tampa, Florida

Sales agents: BRADLEY & BAKER

155 EAST 44th STREET • NEW YORK 17, N. Y.

District Sales Offices: ATLANTA, GA. • INDIANAPOLIS, IND.
ST. LOUIS, MO. • NORFOLK, VA. • HOUSTON, TEX.

PUT THESE EXTRA SALESMEN TO WORK FOR YOU

Included in the large amount of promotional and educational material prepared by Hercules are many items that can help you sell more insecticides. If you haven't already done so, why not add these aids to your selling force?

Insect identification folders make ideal inserts for dealer mailings; wall charts, decals, and streamers do an on-the-spot selling job in dealers' stores; specially treated weather-resistant materials are available for outdoor displays; newspaper mats, radio scripts and TV films dovetail with your own advertising campaign.

If you are not now making full use of this free material, your toxaphene representative can give you complete information.

TOXAPHENE dusts · sprays

Agricultural Chemicals Division, Naval Stores Department

HERCULES POWDER COMPANY

970 Market Street, Wilmington 99, Delaware

Plants at Brunswick, Ga.; Hattiesburg, Miss. Offices at Atlanta, Ga.; Birmingham, Ala.; Brownsville, Texas; Boston, Mass.; Chicago, Ill.; Dallas, Texas; Denver, Colo.; Detroit, Mich.; Los Angeles, Cal.; New York, N. Y.; Raleigh, N. C.; St. Louis, Mo.; San Francisco, Cal.; Toronto, Canada

THE CHEMICAL BASE FOR TOXAPHENE IS PRODUCED BY HERCULES FROM THE SOUTHERN PINE

NX55-17 (8)